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The nine papers contained in this symposium report deal with changes in a wide variety of social, economic, and cultural patterns of the Indians and Spanish speaking peoples of the Southwest, with emphasis on land use practices. Historical perspectives are presented to illustrate the gradual shift of these peoples from a pastoral, semi-agricultural society to one based on menial or migratory labor. Emphasis is also given to the need for development of a philosophy and planning techniques which would eliminate, in the future, some of the problems evident today. (DK)

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# Indian and Spanish American Adjustments to Arid and Semiarid Environments

edited by
Clark S. Knowlton

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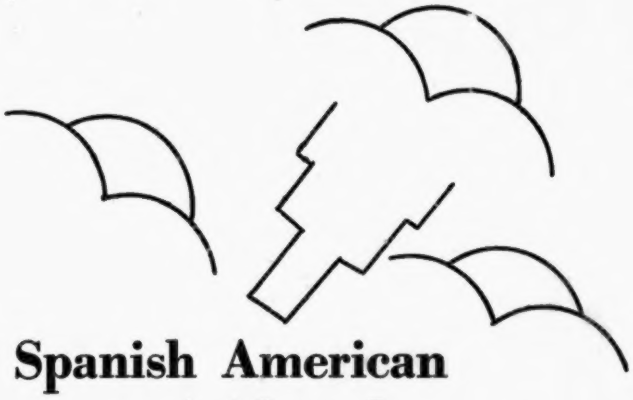

# Indian and Spanish American Adjustments to Arid and Semiarid Environments

A Symposium held during the fortieth annual meeting of
the Southwestern and Rocky Mountain Division of the
American Association for the Advancement of Science.
April 28, 1964
Lubbock, Texas

*arranged by*
Clark S. Knowlton

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# Introduction

**Clark S. Knowlton**
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The arid lands of the Southwest are undergoing tremendous social and cultural changes that are modifying the very essence of human life in the region. Impressive population increases, rapidly growing oasis like metropolitan centers linked across empty distances by superhighways, a precarious industrialization, oil and other mineral discoveries, and the development of numerous government installations are etching in a framework of a new Southwest quite distinct from the old. The traditional Southwest of the cowboy, the miner, the farmer, the Indian, and the Mexican is receding into the background. The Indian and Spanish-speaking groups and traditions, once such strong components of Southwestern life, mean little to the flood of urban English-speaking migrants. A strong and persistent drive toward the eradication of linguistic and cultural differences is underway.

The Indian and the Spanish-speaking groupings share certain experiences in common that differentiate them from other American minorities. Both became citizens of the United States through military conquest. Both were guaranteed protection of property and of civil rights through treaties that were violated as soon as they were signed. Both were treated as conquered peoples. And both today are submerged minorities existing in difficult social and economic conditions.

Their paths now separate. The Indians, because of the glamour attached to them, the interests of anthropologists in their history and culture, the existence of ruins and handicrafts that attract tourists, and the ambivalent protection of a government bureau and of powerful private organizations, have fared much better than the Spanish-speaking groups. Their position in the socio-economic structure of the Southwest is improving, while that of the Spanish-speaking is deteriorating.

Although the Indians have received constant but uneven attention from anthropologists and other social scientists, the Spanish-speaking groupings have been quite neglected. The major social, cultural, and economic changes taking place among them have not, except for an occasional study, caught the attentions of scholars in the region. Most of these studies are now out of date.[1] Very little is actually known about the modern trends of changing land use and land tenure, of migration patterns, of changes in family structure and leadership patterns, and of acculturation and assimilation among them. Marked by high indices of social disorganization such as juvenile delinquency, family breakdown, welfare, and poverty, they are becoming a serious handicap to the economic growth of certain parts of the Southwest.[2]

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[1] George I. Sanchez, *Forgotten People,* (Albuquerque, N.M.: University of New Mexico Press, 1940); Paul A. F. Walter, Jr., "A Study of Isolation and Social Change in Three Spanish-Speaking Villages of New Mexico," (unpublished doctoral dissertation, Stanford University, 1941); Charles P. Loomis and Olen E. Leonard, *Culture of a Contemporary Rural Community* (Washington, D.C.: Bureau of Agricultural Economics, U.S. Department of Agriculture, 1941); Lyle Saunders, *Cultural Differences and Medical Care* (New York: Russell Sage Foundation, 1954); John H. Burma, *Spanish-Speaking Groups in the United States,* (Durham, N.C.: Duke University Press, 1954). These are samples of a number of studies that were made up to 1955.

Unfortunately, few planners and scholars are aware that the diverse Spanish-speaking groups in the Southwest vary significantly in racial composition, in rural and urban residence, in land use and land tenure, in language, in historical experiences, in cultural characteristics, and in differential exposure to the dominant Anglo-American society. They are usually classified together as a Spanish-speaking minority group of Mexican origin. There exists a definite need to delineate the cultural characteristics of each of the Spanish-speaking groups in the Southwest, a work that was started by McWilliams twenty years ago.[3]

This symposium was therefore organized around the theme of Indian and Spanish American Adjustments to Arid and Semiarid Environments. It was intended to secure papers on the more important Indian and Spanish-speaking groups in the Southwest. This proved to be impossible. Three of the more important Arizona Indian groupings are covered while those of New Mexico are somewhat neglected.

The Spanish Americans of northern New Mexico are the only Spanish-speaking group represented. The significant Spanish-speaking elements around El Paso, along the Rio Grande below El Paso, in southern Colorado, and in northwestern Arizona are not discussed in the symposium. As it was not possible to secure the papers needed for a balanced representation, a personal decision was made to invite several scholars working in specific aspects of human adjustment and maladjustment to arid land conditions in the West to participate in the symposium.

A decision was also made to secure participation from groupings not normally represented in this type of symposium. Many groups and individuals exist in the Southwest who are active in the study of various aspects of human adjustment and maladjustment to arid land conditions. Many of these groupings and individuals are isolated from each other. Physical isolation is not the only casualty of the distances of the Southwest. Intellectual isolation also exists. For those interested, there are three anthropologists, three sociologists, one Presbyterian village field worker, one regional planner, one architect, and one Spanish-American village leader and mental health worker among the symposium participants.

The papers by Hackenberg, Brugge, and Getty present a comprehensive historical treatment of changing land use patterns among the Pima-Maricopa, Navajo, and Western Apache respectively. Hackenberg points out that many Indian groups have struggled to farm by irrigation in the Gila area. Salination and drought cycles brought ultimate failure in the pre-American period. In the American period, overgrazing by American ranchers caused disturbances in the river run-off. Subsequent sedimentation, widening of the river channel, and flooding have brought about a serious weakening of agriculture. Many Pima are now turning to wage labor.

The Apache and Navaho entered the Southwest as hunters and food collectors. The Navajo, deeply influenced by Pueblo and later by Spanish colonial cultures, acquired livestock and agricultural patterns. These became their principal sources of livelihood. The Apaches, more remote from the Pueblos and at war with the Spanish, remained hunters and food collectors throughout the historical period. Livestock acquired through raiding and farming supplied a certain percentage of their food requirements. Since 1870 the Navajo, more receptive to innovations, have adopted a variety of economic activities. Population pressure is forcing many of them to engage in labor off of the reservation. The Western Apache are turning toward the development of a cattle industry. Among them, agriculture has been virtually abandoned. Few as yet are seeking employment away from the reservation.

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[2] Clark S. Knowlton, "The Spanish Americans in New Mexico," *Sociology and Social Research*, 1961, 45:448-454.

[3] Carey McWilliams, *North From Mexico*, (New York: J. B. Lippincott Co. 1949.)

Sazaki presents a case study of a Navajo community in the heart of the reservation. The federal government invested substantial amounts in the development of an irrigation system to encourage the Navajo to farm. Drought and mistakes in planning brought the project close to failure. Although some Navajo continue to farm, many are combining farming with livestock and wage labor.

In Steven's paper, some data is given on the New Mexican Indians. He mentions that population increase on the Navajo and Pueblo reservations are forcing many into wage work in the neighboring rural and urban communities. The Jicarilla Apache are concentrating around the tribal center, Dulce, to receive per capita payments from petroleum, gas, and timber sales. They are abandoning other types of economic activities. In another section of his paper, he points out that the Spanish Americans have lost their landholdings through involvement in an alien economic and political system. Because of land loss, they are having to turn to unskilled employment.

He does not mention that virtually every technique of force, fraud, legal interpretation, and tax manipulation was used by the invading Anglo-Americans to divest the Spanish Americans of their land. The Spanish Americans were trapped without recourse, flies in the spider web of the legal and political system of a dynamic, ruthless, competitive, commercial Anglo civilization. Furthermore, every major irrigation or water conservation project along the Rio Grande River from the Elephant Butte Dam to the Middle Rio Grande Conservancy district has been responsible for land alienation on an extensive scale. The Spanish Americans have been replaced by Anglo-American farmers. Their subsistence agriculture has made way for a highly commercial, partially subsidized, and basically insecure agriculture, made possible by government programs. Little thought has ever been given to the rights and land use patterns of the Spanish Americans in planning water projects in New Mexico and in neighboring states.[4]

With the decline of the Indian menace in the middle of the 19th century, Spanish Americans began to move down every stream flowing from the mountain masses of northern New Mexico. By the 1870's their villages and sheep ranches had penetrated deep into the plains of western Texas and southeastern Colorado. The westward moving Texas cattle frontier overran the Spanish Americans and by force pushed them steadily back toward the mountains. By the end of the 19th century they had left the plains of Texas and Colorado. The first World War found them falling back in eastern New Mexico. At present, Texas ranchers are pushing them off the plains back toward the Sangre de Cristo Mountains. This replacement of Spanish-American villages by Texan cattle ranchers and of irrigated farming and sheep husbandry by cattle ranching has gone unnoticed by the majority of students and scientists in the Southwest. It is still an on-going process.[5]

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[4] Clark S. Knowlton, "Causes of Land Loss Among the Spanish Americans in Northern New Mexico," *Rocky Mountain Social Science Journal,* 1964, 1:201-211.

The chronic land loss, the pressure of the Texans, and the inability of the Spanish Americans to secure assistance from private or government sources have forced them to migrate. A depopulation process is at work in northeastern New Mexico. The Spanish Americans forced from the land are moving in large numbers as unskilled workers into the urban centers of New Mexico, Colorado, Southern California, and Utah. They are entering the urban occupational structure on the lowest level. Unable to secure permanent employment, large numbers become personally and socially disorganized. Behind them in the villages remain the apathetic, the old, the young, and those who are determined to retain their land as long as possible.[6]

Few Spanish-American migrants sell their little irrigated plots. The range land they have lost. However, they endeavor to retain their farming land, even though they have migrated to urban centers. It is a form of insurance against periods of unemployment. During their absence, the land remains unused and abandoned. Irrigation structures deteriorate. Substantial quantities of land in the Spanish-American villages are in this condition.

Atencio, a Spanish-American village leader and mental health worker in the upper Rio Grande Basin in New Mexico, presents in his paper a perceptive philosophical discussion of traditional Spanish-American attitudes toward the land, the patterns of land tenure and land usage, the impact of land loss upon the Spanish-American culture, and the reasons for continued depopulation. He also suggests in a somewhat pessimistic strain that Spanish-American attitudes and values be considered in any land use planning for northern New Mexico.

Van Dresser, a regional planner long active in northern New Mexico, also suggests that local Spanish-American and Indian villages and settlement patterns offer a framework for the development of an economically healthy region through utilization of local manpower and natural resources. He fears that massive urbanization, industrial concentration, and commercial development of the region may continue the present process of poverty and regional depopulation.

Kraenzel analyzes the present institutional maladjustments of the Anglo-American civilization in the arid regions of the West. He suggests institutional modifications that may solve some of the problems of social maladjustments in the area. He believes that the values of the Indian and Spanish-speaking groups of the Southwest are worthy of study as types of successful adjustment to an arid land environment.

Ingraham, a Colorado architect, suggests that much of the urban planning and architectural development of the arid West is maladjusted and extremely insecure. He believes that urban planning and architecture must adjust to the natural environment and perhaps use native materials and forms. He offers many suggestions that are worthy of study.

The papers of the Symposium jointly indicate that the Indian and Spanish-speaking groups are undergoing rapid social and cultural change in land usage and land tenure practices. They have lost their ability to determine their own future or to use their land in a traditional manner. For better or for worse, they are becoming meshed in and subordinate to the Anglo Southwest.

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[5] *Ibid.*, "The Spanish Americans in New Mexico."

[6] *Ibid.* See also Clark S. Knowlton, "Patron-Peon Pattern Among the Spanish Americans of New Mexico," *Social Forces*, 1962, 40:12-17.

The dramatic acceleration of urbanization, industrialization, the impact of these upon land and water resources, and rapid social and cultural change demand increased attention from scientists and scholars in the area. Studies of hydrology, of geology, of archaeology, of climate fluctuations, of soil erosion, and of flora and fauna are extremely important. However, they must be accompanied by studies of social and cultural factors, if a comprehensive picture of the Southwest is to be obtained. Furthermore, such data is absolutely essential for proper planning of scarce natural resources.

# Changing Patterns of Pima Indian Land Use

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## INTRODUCTION

The central portion of the Gila River Valley today is a heat-blasted wilderness of sandy plains, rocky pinnacles and ridges, with a thin scattering of thorn-bearing shrubs and cacti. Twisting through it from east to west is a mile-wide scar of lighter colored sand, flanked by straggling rows of mesquite trees. This is the channel of the Gila River, dry now except during mid-winter and late summer floods, when a half-million acre-feet of water race between its crumbling banks, further eroding them and dissolving additional tons of topsoil. Sharp contrast is provided by the vivid green of a hundred thousand acres of irrigated crop-land which checkerboards the valley floor.

This inhospitable country, though always sparsely settled, is nearing the end of its second millenium of occupation by man. The banks of the Gila River, below the town of Florence and above its junction with the Salt River 65 miles to the west, have furnished community sites successively to the Hohokam, Pima and Maricopa Indians, and more recently to Anglo-Americans. Approximately 10,000 members of the latter three groups continue to reside in the region today.

During the 19th century, this historic country evoked a very different description. An early geographer of Southern Arizona, J. W. Hoover (1929: 41), described the valley as it appeared in 1875:

> "Old settlers are united in describing the Gila as without braided shifting channels. Cottonwood, brush, tall grass, and weeds bordered the river which was confined to a narrow channel . . . There were no stretches of bare and sandy waste such as are found everywhere along the river now. Tall grass ,sometimes several feet high, covered the whole countryside yearly . . . Lakes and ponds were once common over the river flat where there is no trace of them today."

In the 1850's, we find that estimates of the width of the Gila ranged from forty feet (Eccleston 1950: 207-215) to 120 feet (Parry 1857: 20).

At this time, above the rich silty bottomlands, bearing cottonwoods and arrow-weeds, were two distinct terraces. The lower terrace, nearly four miles in width in the Casa Blanca District opposite Gila Butte, contained level and fertile soil, and was subject to occasional inundation by master floods. Beyond it, on both banks of the river, are relatively sterile areas of heavy salt impregnation which comprise an upper terrace supporting little vegetation except saltbrush (Parry 1857: 20; Hoover 1929: 46-48). This terrace extends to the foothills of the surrounding mountain ranges.

On the west, these terraces terminate near the junction of the Gila with the Salt River in the district which the Pimas call *Mass Akimult*, or "clear river". Southworth (1919: 139) described its appearance in the first decade of the present century:

> "This district is a portion of the broad river bottom in which the clear underflow appears in springs, forming numerous little lakes or sloughs dividing the low bottom lands into small tracts or islands . . . cultivation never became very extensive in this region . . . because of the constant damage of floods . . . This particular area is situated in a very hazardous position with respect to the river, since every large flood completely changes the topography . . ."

Throughout the historic period, the western portion of the middle Gila River displayed ill-defined banks and a meander pattern which made fixed field locations impossible.

On the east, the upper and lower terraces were also bounded by a formation frequently called an island, but of very different origin. This island, roughly a mile in width, lay between the main channel of the Gila on the north, and an extensive prehistoric canal on the south. This great excavation, which carries water westward for twenty-nine miles, appears on many maps as the Little Gila River. The dimensions of the island, an extremely fertile strip of bottom land below the first terrace, were fixed by Savage (1871) who also determined the width of the main river channel to be one hundred feet, and said the Little Gila was fifty feet wide. Southworth (1919: 130-131) was the first writer to note the frequent confusion of the Little Gila Canal with the main channel by 19th century writers:

> "It is evident that some of the earlier adventurers into this region were of the opinion that the Little Gila was the main river channel . . . The banks of the Little Gila in many places are fifteen feet or more in height, while the banks of the main river are seldom more than six or seven feet high."

Quoting George Pablo, a Pima Indian born in 1849, Southworth (1919: 29-40) reports that he thought the Little Gila was the important stream during his youth. Since it was cut deeper than the main channel, it carried the continuous flow of the river during the major part of the year. The main channel of the Gila received only flood water. This prehistoric canal continued to carry the major portion of irrigation water to the fields along the Middle Gila until the disastrous floods of the present century (1) silted it partly shut; (2) cut a pathway from the end of the original canal back to the bed of the main river. For about one-third of its distance, approximately ten miles, the Little Gila Canal was parallelled on the north side of the main channel of the Gila by another prehistoric canal leading to the famous Snaketown excavation conducted by Gila Pueblo in the 1930's. Until altered by the heavy floods of the present century, both these canals terminated in the salt-impregnated upper terraces.

Throughout the major portion of its occupation by man, then, the middle Gila River Valley has been characterized by the following environmental features:

1. A narrow river channel with accentuated banks, containing flowing water eight or nine months of the year.

2. Fertile islands, regularly inundated, at the same level as the river channel.
3. A lower terrace, consisting of fertile land subject to occasional flooding.
4. An upper terrace of infertile, salt-impregnated soils, above the flood level of the river.

Within the framework of these environmental features, four different types of land use and a number of variations upon them have been developed. We may refer to these as (1) Prehistoric Hohokam; (2) Early Historic Pima-Maricopa; (3) Late Historic Pima-Maricopa; (4) Modern Anglo-American. The inclusion of the Hohokam and American patterns of land use would appear to deviate from both the title of this paper and from its intent. However, the purpose of this discussion is to demonstrate that both prehistoric and contemporary events have shaped the changing patterns of Pima land use.

## PREHISTORIC HOHOKAM LAND USE

Between the beginning of the Christian era and the end of the 15th century, the middle Gila River Valley was occupied by the archaeological culture known as the Hohokam (Gladwin *et al*, 1937). The architectural remains of this occupation may be seen today at Casa Grande National Monument, the Casa Blanca Ruin on the Gila River Pima Indian Reservation, and the site of the Snaketown excavation.

Major indices of the nature of Hohokam land use for subsistence purposes are found in the presence of the major canal system mentioned above, and the absence of animal remains in excavated Hohokam sites (Gladwin *et al* 1937: 50). The earliest of these canals was dated in the Santa Cruz phase, approximately 800 A.D. (*Ibid.* 1937: 53), but maximum size was not reached until 1200-1400 A.D. (*Ibid.* 1937: 58). The capacity of their irrigation system and the absence of animal remains indicates near-complete reliance of the Hohokam upon agriculture and little concern with hunting.

The Hohokam canals were in every case longer and wider than those later employed by the Pima and Maricopa Indians. These dimensions are most readily explained in terms of the destination of the water conveyed by these impressive examples of hydraulic engineering. As noted above, both these canals terminated in the salt-impregnated upper terraces, several miles away from the main channel of the river. To bring water to this elevation, twenty-five to fifty feet above the level of the stream, it was necessary to locate the headings of these canals at points far up the river. Also, since the upper terraces were removed from the flood plain of the Gila, their cultivation required complete reliance upon moisture provided through irrigation. Woodbury (1962) provides data indicating the average bottom width of Hohokam canals on the Gila was ten to eleven feet, and they were six to seven feet deep. In reaching these figures, he did not consider the dimensions of the Little Gila Canal (fifty feet wide and fifteen feet deep), which have been greatly increased by the action of floods.

The Hohokam cultivated portions of the upper terraces upon which their canals conveyed irrigation water, but, because they ran very close to the edge on both north and south sides of the Gila, it would have been possible to bring laterals down to the level of the lower terraces as well. Acreages *available* for cultivation on the lower terraces are much greater in size than those showing *actual* cultivation on the upper terraces. Subsequent cultivation by the Pima-Maricopa has obliterated possible traces of Hohokam agriculture on the lower levels, however. Salt deposits on the surface of the sterile upper terrace lands today indicate the possible cause of the removal of the Hohokam from this area. It is the consensus of archaeologists that this situation is the result of intensive prehistoric cultivation (Halseth 1932: 167-168; Hayden 1945: 373-378; Hayden 1957: 105-111). Through heavy irrigation, the ground water table rose, bringing dissolved salts in solution to the surface of the land. When soils dried, these salts crystallized as visible deposits. On the lower terraces, if such deposits formed, they were washed away through continuous flooding with river water following the departure of the Hohokam cultivators.

The elaborate engineering of the Hohokam canals served to unite sufficient amounts of irrigation water and arable land to support a dense population. The flow of the Gila River opposite the flat, fertile terraces of the Casa Blanca District was often lost in the deep sand of its channel. Sometimes for entire seasons the river ran underground for thirty miles between the island formed by the Little Gila and the *Mass Akimult* District. To circumvent this irrigation problem the Hohokam brought water down from far upstream.

## EARLY HISTORIC PIMA-MARICOPA LAND USE

At the beginning of the historic period, the Pima and Maricopa populations were both relatively small and widely dispersed. Some 2,000 Gila River Pimas were scattered over 53 miles of the middle Gila Valley between the Casa Grande Monument and the Gila-Salt junction. Their Maricopa allies extended below the junction to a point halfway between Gila Bend and Yuma, and numbered perhaps one-half as many as the Pimas. Spanish missionaries of the late 17th century found a mixed subsistence pattern among the occupants of these scattered villages of northern-most Pimeria Alta. While cultivating maize, beans and squash, great reliance was placed upon gathering sahuaro cactus fruit and mesquite beans. The vegetable diet was augmented by rabbit hunts and by fishing. According to Castetter and Bell (1942: 56-57), ". . . the Pima cultivated crop in average years comprised about 50 to 60 per cent of the total food supply, wild plants and animals constituting the remainder; thus food gathering was absolutely necessary to supplement the inadequate cultivated crop."

Though both irrigation and wheat cultivation appeared among their Sobaipuri neighbors between 1690-1710 in the San Pedro and Santa Cruz River Valleys, there is no mention of either among the Pima-Maricopa until the account of Sedelmayr in 1746 (Ives 1939: 105-106). Although they grew the same crops as the aboriginal Gila Pimas, it is known positively that the Maricopas located below them on the river at this time did not irrigate their fields (Spier 1933: 23-24, 58-59), relying instead upon the natural inundation of the seasonal floods to mature seeds planted in the mud of the river flats. After their relocation above the Gila-Salt junction at the end of the 18th century, they used the islands of the *Mass Akimult* District for unirrigated farming. The Maricopa continued this form of flood-water farming on the Gila islands until about 1850.

The dispersed Pima settlement pattern at the beginning of the 18th century suggests that they may have chosen to locate their villages near low-lying islands where flood-farming was possible. Sedelmayr (1955: 23) in 1744, and Nentwig (Guiteras 1894: 128) in 1761-62 mention island cultivation by the Pima specifically, but add that lands along the river banks were also planted. Certainly, there is a good possibility that the Pimas were subsisting without irrigation at this time. Castetter and Bell (field notes, 1939) reported a tradition that, before the coming of the Spanish, the Gila was shallow and, instead of ditches, the Indians would divert flood water over their lands using logs and piles of brush as water spreaders. The informant stated that the Pimas knew about ditches at this time, but they were ineffective because of the poor tools employed in their construction.

Beginning with the mid-18th century, a number of basic changes took place in the pattern of Pima-Maricopa land use. These changes included both additions to the crops produced in the Indian communities, and basicly different methods of production. The impetus for them seems to have taken the form of increases both in population and in population density. During the later Spanish contact period some 3,000 Pimas were concentrated within eighteen miles of river valley in villages which were in close contact with each other. For this compacted population, reported by Anza in 1775 (Bolton 1930 v. 3: 17-20; v. 4: 33-45), increased reliance upon cultivation was a necessity, for their numbers precluded dependence upon hunting and gathering.

The center of the contracted Pima settlement, like that of the Hohokam before them, appears to have been in the Casa Blanca District. It was here that, in 1746, the cultivation of wheat and the use of canal irrigation was first observed by Sedelmayr. By 1775, the Anza expedition reported five canals in use, and a dam under construction involving the employment of communal labor supplied by several villages. While the transition to dependence upon agriculture was clearly an 18th century phenomenon, technical information on the land use pattern did not become available until the following century, which falls within the next historical period.

## LATER HISTORIC PIMA-MARICOPA LAND USE

The full details of later Pima-Maricopa land use are contained in the many mid-19th century accounts which were contributed by the Kearny and Cooke expeditions of 1846 during the Mexican War, the gold-seekers journals of 1849, and the reports of the U. S. Boundary Commission which, in 1852, attempted to survey the line established by the treaty of Guadalupe Hidalgo. From these we learn that the Communities of the Pima Indians have been further contracted into a single contiguous settlement of huts and fields, ten miles in length, in which they have been joined by the entire Maricopa tribe, making a combined population of nearly 5,000. The center of this "Indian city" (Couts 1961) was in the Casa Blanca District, and all habitations were concentrated on the south side of the Gila, where they formed a defense perimeter against Apache raiders. Some fields were located on the north bank on the lower terrace below Snaketown, however. This combined settlement represented the most intensive development of irrigation agriculture since Hohokam times.

An officer with the Kearny expedition (Emory 1848: 83-86) observed, "We were at once impressed with the beauty, order, and disposition of the arrangements for irrigating and draining the land. Corn, wheat and cotton are the crops of this peaceful and intelligent race of people. . . . The fields are subdivided, by ridges of earth, into rectangles of about 200 by 100 feet for the convenience of irrigating. . . . For the whole distance we passed through cultivated grounds over luxuriantly rich soil. . . . The bed of the

Gila, opposite the village, is said to be dry; the whole water being drawn off by the *zequias* of the Pimas for irrigation; but their ditches are larger than is necessary for this purpose, and the water which is not used returns to the river with little apparent diminution in its flow. . . . They have but few cattle, which are used in tillage, and apparently all steers, procured from the Mexicans. Their horses and mules were not plenty, and those they possessed were prized extravagantly high. . . . Their implements of husbandry were the axe (of steel), wooden hoes, shovels, and harrows." The author's reference to a harrow documents his observation of the presence of the Mexican plough: a non-metallic instrument with a tongue of mesquite wood.

The statement of Boundary Commissioner John R. Bartlett, who visited the Pima-Maricopa community in July, 1852, completes the description of mid-19th century land use (Bartlett 1854 v. 2: 232-233, 262-264):

> "The valley or bottomland occupied by the Pimas and Cocomaricopas extends about 15 miles along the south side of the Gila and is from two to four miles in width, nearly the whole being occupied by their villages and cultivated fields. . . . On the northern side of the river there is less bottom land, and the irrigation is more difficult. There are a few cultivated spots here, but it is too much exposed to the attacks of their enemies for either tribe to reside upon it. The villages consist of groups of from 20 to 50 habitations, surrounded by gardens and cultivated fields, intersected in every direction by acequias which lead the water from the Gila."

Elsewhere in his narrative, Bartlett also comments upon the use of the entire river by the Pima-Maricopa, and gives a full description of the storehouses in which their surplus of grain was deposited.

Between the late Spanish and early American historic periods (1775 to 1852) the Pima-Maricopa land use pattern evolved through several major developments. The Maricopas had abandoned the *Mass Akimult* District and joined the Pimas to the east in the development of a continuous area of fields and ditches, irrigated by the entire flow of the Gila. Ploughs, shovels, axes and other implements had been obtained or copied from the Spanish and Americans, and the use of work animals was known and understood. Some livestock were being raised, and crops were sufficiently abundant that, between 1846 and 1852, the general construction of storehouses took place. The stimulus for increasing production was the market provided by American travelers. Over 60,000 forty-niners alone are said to have passed through the Pima-Maricopa villages.

Using Southworth's data from the Gila River Survey of 1914, it is possible to reconstruct the technical details of the Pima-Maricopa land use pattern at mid-19th century. The consolidated tribes were cultivating nearly 13,000 acres, irrigated by nine ditches combined into two separate systems, each based upon one of the major prehistoric Hohokam canals — the Little Gila Canal on the south side of the river, and the Snaketown Canal on the north side.

Within the Casa Blanca District on the south bank, 8,870 cultivated acres were irrigated through a system of six intersecting ditches which took their headings in the little Gila. Another 3,950 subjugated acres were irrigated by a group of three ditches on the north bank, which were based on parts of the old Snaketown Canal. The ditches used by the Pima-Maricopa averaged four feet in width (at bottom) and two feet in depth, and were approximately one-half the capacity of those developed by the Hohokam. Both the cultivated fields and the ditches irrigating them were contained within the lower terraces on both sides of the river. On the upper terraces, above the flood plain of the river, the clusters of dwellings comprising the villages were located. There were no habitations on the north side of the river until the 1870's, when the Apache menace was terminated by the action of U. S. troops. Since the entire river channel was diverted into the Little Gila to irrigate the Casa Blanca lands on the south bank, irrigation on the north terrace was difficult, as Bartlett observed in 1852. An American missionary, Rev. C. H. Cook, surveyed and reopened a section of canal in 1877 which parallelled the eastern portion of the old Snaketown Canal, permitting residents on the north side of the river to divert irrigation water from further upstream. As the last event indicates, remaining changes in the pattern of Pima-Maricopa land use result from their involvement with Anglo-Americans after the conclusion of the Civil War.

## LAND USE IN THE ANGLO-AMERICAN PERIOD

Anglo-American settlement along the Gila belongs to the post-Civil War period, but during the late 1850's, the Overland Mail Co. located stations at the Pima-Maricopa villages, making annual purchases of several million pounds of grain and stimulating increased wheat production. In 1858, the original Pima-Maricopa reservation of 100 square miles was established by executive order. This reservation did not include the island formed by the Little Gila, which was not added until the 1870's. By 1915, the reservation was expanded to include both banks of the river from the Casa Grande Monument to the Gila-Salt junction. This expansion was made necessary by events belonging to the last half of the 19th century.

The causative factors for the expansion of Indian settlement may all be found in the history of the decade 1865-1875. First, the behavior of the water supply became erratic and undependable. There was a disastrous flood in 1868, eliminating three entire villages and their fields. The decade of the 1870's was characterized by extreme drought which, in several years, parched the mesquite trees and prevented the beans from maturing. The water supply was generally less than normal for the remainder of the century, though there were some good years. Second, termination of Apache hostilities encouraged American settlement. Resulting mineral activity created a demand for foodstuffs which were met in part by Indian crops. A steam flour mill was located at the Pima-Maricopa settlement by an enterprising trader. Creation of a market tempted Indians to increase their land holdings, and non-Indians to establish settlements on the middle Gila, at the same time that water supplies were becoming critical through all of southern Arizona.

The Indians who had consolidated in the face of the Apache threat promptly dispersed when confronted with peace and military security. Their decentralization was encouraged by frequent failure of crops in the old Casa Blanca District, and the lure of cash markets for grain if they could find better water sources elsewhere. Villages and parts of villages moved upstream to positions opposite the island formed by the Little Gila, founding the district known as Blackwater. Since water was too low for flood-plain cultivation, the island was spanned with an elaborate ditch system, diverting from the Little Gila.

As a result of large-scale emigration from Casa Blanca District, its irrigation system deteriorated. Upstream diversion, both by the Blackwater Indians and non-Indians in the vicinity of Florence prevented water from reaching this western district except during floods. Competition between the two districts for water supplies led to the Blackwater War of 1878-79. Few people were killed but the districts remain unfriendly to the present time. Other settlements moved westward into the *Mass Akimult* District and practiced flood-plain cultivation of its islands. In the mid-70's, several entire villages abandoned the old Snaketown District and moved to the Salt River Valley where a reservation was created for them in 1878. In all, 17 new ditches were excavated along the Gila between 1860 and 1900, and most of them were soon abandoned. The largest part of the Maricopa tribe withdrew to a separate settlement on the Salt River near its junction with the Gila. Testimony taken by the Board of Indian Commissioners in 1904 established that most of the Indians had lost all crops for the previous six years, had sold large holdings of livestock, and were living from sales of firewood to non-Indians.

Though non-Indians in the Florence District have sometimes been blamed for the deprivation suffered by the Pima-Maricopa, all the communities of the middle Gila River valley were equally hard-hit.

The explanation for this appalling devastation has been given by Hoover (1929: 41-45):

> "The changed behavior of the Gila is generally attributed to overgrazing in the upper basin. Before 1870, there were few cattle, but they increased rapidly after the settlement of the Apache Indian troubles . . . During the eighties there was a series of wet years with abundance of natural forage. The ranges built up rapidly and overgrazing resulted. During the same time the mountains of the upper basin of southeast Arizona were being rapidly stripped of their timber for use in the mines. . . . The end came with the disastrous flood of 1891. Before this, the floodwaters of the Gila merely spread out over the flats and irrigated them. Now, with the banks of the river unprotected by grass and brush, the channel suddenly widened and many good ranches along the river were cut out."

These factors were confirmed and enlarged upon by Senator Hayden (1929: 41) in his "Information Presented to the Committee on Indian Affairs, House of Representatives," urging them to authorize the completion of the San Carlos Federal Irrigation Project, 1924, concluding, ". . . the nature of the Gila River has been so changed by overgrazing that, without reservoirs to store its flood waters, that stream is no longer dependable for irrigation."

During the present century, the federal government has taken many steps to arrest and reverse the deteriorating tendencies in Pima-Maricopa land use which have been present since 1865. These steps have included land tenure, irrigation and land subjugation. Between 1914 and 1921, the Bureau of Indian Affairs issued title to 98,000 acres of Gila River Reservation land in the form of 10 acre allotments. Between 1924 and 1930, various government agencies constructed the Coolidge Dam and San Carlos Reservoir, and organized the San Carlos Indian Irrigation Project. The aim of this reclamation program was to store 900,000 acre-feet of irrigation water for the purpose of irrigating 100,000 acres of crops in the middle Gila River Valley. The land within the irrigation district is equally divided between the reservation Indians and non-Indian holdings west of Florence. Between 1930 and 1938, the Bureau of Indian Affairs conducted a massive subjugation program, clearing, leveling and ditching over 45,000 acres of Pima-Maricopa lands within the San Carlos Irrigation District. Most of this land was also planted in barley or alfalfa — soil-building pasture crops instead of the soil-depleting wheat grown in the past by the Indians.

In response to these measures, the Indians have moved from their formerly compact villages to individual farmsteads. A few families eke out a decent living from leasing blocks of allotments and producing pasturage for sale. A few others have become prosperous through production and sale of commercial quantities of cotton at government-supported prices. Indian crop-land in annual production remains less than 20,000 acres, however; less than half the land included within the San Carlos Irrigation District.

The majority of Indian wage-earners prefer to seek labor off the reservation than to attempt to anticipate the vagaries connected with efforts at farm production. Project water supplies have been uncertain, and allotments of irrigation water have generally been less than adequate for the cultivation of barley or alfalfa. The optimistic part of the Pima-Maricopa land use picture today is that concerning the tribal farm. The Pima-Maricopa Community Farm is a well-managed cooperative enterprise which, with pump-irrigation to supplement reservoir water, keeps a major share of its 11,000 acres in continuous cultivation. Wheat, cotton and pasture crops have all been raised successfully on the community farm since its inception in 1952. It makes an annual quarter-million dollar contribution to Indian family income in the form of wages paid to farm workers.

## CONCLUSIONS

Three successive attempts at the establishment of a land use pattern have taken place during the history of human occupation of the middle Gila River Valley. These patterns have all been variants on the single theme of irrigation agriculture. The first was made by the prehistoric Hohokam, the second by the consolidated Pima-Maricopa Indian community, and the third by Indians and Anglo-Americans with support of the federal government of the United States. The results seem to be confined to the dark end of the spectrum, in the narrow range between failure and disaster. The limited efforts at water management and control attempted by the Pima met with the same fate as the later and larger efforts at total control of river basin resources made by the federal government.

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# Navajo Land Usage: A Study in Progressive Diversification

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## INTRODUCTION

The Navajos, as an Athabaskan-speaking tribe, are generally conceded to have entered the southwestern United States in relatively recent times, estimates ranging from as early as 1000 A.D. to as late as 1550 A.D. In spite of considerable research which has been devoted to the problems of their time of arrival and the route by which they came, these problems are far from solution and there is considerable variation in the conclusions of the different authorities who have worked on them. My own preferences, based upon admittedly scanty evidence, are that the Navajos and other Apaches came by way of the Rocky Mountains and the lower country on both sides, but particularly the east, entering the southwest during the Puebloan contraction that began with the Great Drought of 1276-1299. For the purposes of this discussion this concept of Athabaskan migration will be used, but most of the ideas to be expressed do not depend upon its accuracy and thorough investigation of its validity is beyond the scope of this paper.

## HUNTING AND GATHERING, ? - ?

It is generally agreed that the Athabaskan ancestors of the Apacheans left their northern homeland with a hunting and gathering economy which they had been practicing for an unknown number of generations. There can be little doubt that fishing was also a part of this economy, a theory supported by the wide-spread distribution of fishing among the northern Athabaskans. (Underhill, 1956, pp. 4-5) Among the southern Athabaskans, only the Navajos, Western Apaches and some of the Chiricahuas had a taboo against fish, which they shared with the western Pueblos. (Gifford, 1940, p. 90) Fishing is of particular interest as it was probably the only major economic activity lost as a result of taboo.

The economy with which the migrants started out was one adapted to northern latitudes and hunting was probably the most important. The most important weapon was the bow, sometimes sinew-backed, with which simple wooden arrows were shot, and traps and snares of various sorts were commonly used. One of the more important methods of obtaining game was the communal drive led by a shaman who had supernatural power to ensure its success, often with the aid of the chute-and-pound. As the migrant bands moved southward they found that the environment to which their economy was best adapted was continually found at higher altitudes and they tended to spend a part of their time at least within this environment. Excursions into the lower country on each side of the mountains must have occurred, however, and familiarity with these new environments increased as they moved farther south and the combined influences of latitude and altitude progressively restricted the traditional environment to less area. Their neighbors on the east were people of the Upper Republican Aspect who practiced agriculture. (Wedel, 1959, pp. 616-19) If they arrived sufficiently early, they may have been briefly in contact with the agricultural Fremont culture on the west. (Gunnerson, 1962, p. 41) The Apacheans' first ventures into the grasslands were probably in pursuit of bison, but these would have brought them, sooner or later, into contact with agricultural peoples. While in the north, their neighbors would have had economies very similar to their own and intertribal trade would have been very limited as all tribes would be producing the same sorts of goods, except perhaps for goods requiring minerals with limited distributions. The differing economies of the Apacheans and the agricultural peoples would encourage an exchange of goods and the Apacheans probably first learned to use agricultural products at this time.

## INTRODUCTION AND DEVELOPMENT OF AGRICULTURE, ?-1750

There is no certain evidence to show whether the Navajos, at the time they entered the Southwest, were cultivating any of their own food. The earliest examples of maize from Navajo archaeological sites are of southwestern types (Hester, 1962, p. 70), but the differences between northern Pueblo and western Plains maize varieties of the historic period were not great and a tribe intruding into a new area, even if previously agricultural, would soon find that the local varieties were better adapted to the new environment than those they brought with them. At any rate, it would seem a reasonable assumption that once they entered the Colorado Plateau area, an area where the game resources were more limited than in their old homes, they would begin to place more reliance upon plant resources and that agriculture, if not already practiced on a small scale, would soon be tried.

Early 15th century descriptions indicate an economy in which agriculture was already important. The Navajos were characterized as "very great farmers," but they were also said to live in one mountain range and go to another for their hunting. (Benavides, 1916, p. 44) This suggests that seasonal movements were a regular part of their way of life and that different parts of their range were utilized in different ways, according to the uses to which they were best fitted. Mineral resources were apparently utilized, for Benavides reported that they united in great numbers to prevent Puebloans from entering to help themselves to minerals in Navajo country and it is probable that these were items of trade to the Pueblos, so that it was necessary to prevent the Pueblos from gathering them freely in order to be able to control them for trade. No mention is made of gathering, but there can be little doubt that it was practiced.

During this period tribal income was probably derived about equally from plant and animal sources, with agriculture progressively becoming more important for the plant products. Mineral resources were probably exploited to a relatively minor extent and secondary income through trade with the

Puebloans, and later the Spaniards, would have been of some importance. With the beginnings of Pueblo revolts against Spanish rule and the increasing influx of Pueblos as refugees, new skills were learned in agriculture which would increase its role in the tribal economy. The last revolt, the partially successful Pueblo Revolt of 1680, led to Varga's Reconquest of 1692-96 which sent more refugees to the Athabaskans than at any time previously and their contribution to Navajo culture, as well as its successful integration into the cultural scheme of the Navajos, was one of the most important elements in the development of modern Navajo culture.

At first the refugees settled in the Dinetah area in the northeastern part of Navajo country and their influence was relatively localized. They were a more sedentary people than their hosts and they soon began to build small pueblo-style houses and to plant extensively. Most of their settlements include both pueblitos and hogans, so that an early close family-to-family relationship seems to have developed. They brought some livestock with them, but the quantity was not great and it played a minor role in the overall economy. If the Navajos already were keeping horses, as seems almost certain, the possession of this new stock would readily be recognized as something of value. Dams were built to store water, possibly an innovation. Crops included corn, squash, beans, cotton and some minor vegetables, mostly raised by dry-farming, but with a limited amount of irrigation in favorable spots. Products traded to the Spaniards included buckskins, woven blankets and baskets. (Hill, 1940) The wealth of the Dinetah area increased and for about half a century it was an area of vigorous cultural and economic growth. The Navajos outside of the Dinetah seem to have been relatively little affected by these events at first and continued to live much as their Apache cousins, but with perhaps greater emphasis on agriculture than among the other Apaches. By the 1740's, however, serious stress had developed, aided by a drought and attacks of enemies, particularly Utes, upon their wealthy neighbors. The Puebloan and Apachean ways of life had too many incompatible features to allow the two to exist side by side without some sort of accomodations. Most of the people in the Dinetah emigrated to escape the Utes and two differing approaches to the solution of the cultural differences were tried. The first was an experiment at living in pueblos with Spanish priests and missions. The experiment was a complete failure. (Reeve, 1959)

## PASTORALISM AND MOBILITY, 1750-1868

The second alternative was a re-emphasis of the old Athabaskan traditions, with the Blessingway Ceremony, which may have originated during this period or shortly before, supplying the religious validation and guidelines for later developments. Blessingway forbid stone houses and painted pottery except in restricted contexts and this coincided with a return to a more mobile settlement pattern. (Brugge, 1963, pp. 21-24) The emigration from the Dinetah led to a dispersal of the descendents of the Pueblo refugees throughout the tribe and their influence appears in a development of sturdier hogans, but they were rapidly absorbed and lived much as did the other Navajos. Small dispersed settlements of hogans, which could be more readily abandoned and more easily concealed from enemies, became the custom for all. Property of more portable types became more important. The cultivation of cotton declined and sheep became the principal source of fiber. Although there are few tree-ring dates reported for game corrals, most are from this period (Correll, 1961) and this would seem to indicate that hunting again became more important. Agriculture was not abandoned, however, and for the tribe as a whole probably reached a peak. During the early part of this period most warfare was with the Utes and outside pressures were not unduly strong. It was during this time, however, that Spanish settlers began to infiltrate Navajo country, promising aid in fighting the Utes in return for the right to use the land. By the early 1770's conflicts had developed and the Spanish settlers, having obtained grants to the land from the King of Spain, felt that they owned the land. A secret Spanish alliance with the Utes set off hostilities and the Navajos drove out the settlers, ending some fifty years of peace. (Reeve, 1959, 1960)

From that time on there was seldom complete peace in Navajo country and when the Navajos were not at war with the whites they usually found themselves allied with the whites against other tribes. Problems of defense became increasingly important and economic activities had to be adapted to this situation. Fields were usually planted in the central part of Navajo country, but during periods of war would often be at the extreme side of the territory away from that nearest the hostile group. The species of livestock that could be moved most quickly, horses, sheep and goats, were raised in greatest numbers. There was an increase in population and an expansion into new territory on the south and possibly on the west, while the Navajos seem to have generally held their own against the whites on the east. The success of the adaptation can be attributed to its aspects of mobility and diversity. While any one resource might fail, it was seldom that all failed at the same time throughout the entire Navajo country. Frequent traveling and clan ties allowed for the rapid transmission of news as to the areas which had good grazing, where the crops of piñon nuts and other wild plants were best, where the game was most plentiful or which areas had succeeded in harvesting abundant crops of corn. The loose political structure allowed great individual freedom of action, so that many varied economic activities might be in progress at the same time in widely separated locales, with members of the same extended family participating in several. Long expeditions to trade, hunt bison or prepare mescal were sometimes made beyond the Navajos' own boundaries, but these were of sporadic occurrance.

As the wars increased in frequency, agriculture could be relied upon to a lesser degree due to the need for greater mobility and livestock became more important as a means of producing not only food, but other items. It has frequently been stated that raiding became one of the more important economic activities of the Navajos. While it is true that for certain individuals, particularly the war leaders and the poor, the booty obtained in raids was of considerable importance, the overall result could hardly have added to tribal income. Captured livestock would compensate warriors for time that they might otherwise have spent in farming, herding or hunting, but the attacks by the enemies took or destroyed as much in return, at the same time preventing the full utilization of resources in the areas endangered by the attacks. The growth of trade in Indian slaves, particularly during the period of Mexican rule and the first 15 or 20 years of American rule in New Mexico, coupled with the competition for land and resources between Navajos and whites along the Navajos' eastern border, kept wars going, while traditional enmities, drastic changes in the balance of power when one tribe obtained more and better weapons from the whites than its neighbors, disputes between individuals of neighboring tribes and sometimes instigation by whites caused intertribal wars rather frequently.

The following estimates of Navajo livestock holdings, while quite imprecise for the earlier years, do give some indication of the trends. The estimates have been reduced to sheep units for ease in comparison. Sheep units are 1:1 for sheep and goats, 1:4 for cattle and 1:5 for horses, mules and burros. (Young, 1958, p. 386)

| YEAR | SHEEP UNITS | SOURCE |
|---|---|---|
| 1743 | 3,000 | (Hill, 1940, my estimate based on this) |
| 1786 | 7,800 | (Reeve, 1940, p. 204; Thomas, 1932, p. 350) |
| 1846 | 670,000 | (Bent, 1846) |
| 1846 | 1,000,000 | (Arny, 1873) |
| 1855 | 250,000 | (Davis, 1857, p. 235) |
| 1856 | 500,000 | (Letherman, 1856, pp. 291-92) |
| 1858 | 800,000 | (Miles, 1858) |
| 1863 | 520,000 | (Steck, 1863) |
| 1864-68 | 10,000 | (my estimate based on Wallen, 1864 and Carleton, 1865) |
| 1873 | 225,000 | (Arny, 1873) |
| 1878 | 480,000 | (Hinton, 1878, p. 368) |
| 1880 | 1,809,500 | (Young, 1958, p. 69) |
| 1886 | 1,900,000 | (Upshaw, 1886) |
| 1930 | 1,809,500 | (Young, 1958, p. 69) |
| 1935 | 944,910 | (Young, 1961, p. 154) |
| 1959 | 539,323 | (Young, 1961, p. 154) |

During the first half of the 18th century the livestock holdings increased slowly. Following the dispersal of the residents of the Dinetah the descendants of the Pueblo refugees taught the necessary skills of husbandry throughout more of Navajoland, probably largely by employing poorer Navajos as herders. By 1795 the Navajos were reported to have innumerable herds and to have been increasing their horse herds. (Amsden, 1949, p. 132) The best estimate for the early American period would probably be about 500,000 sheep units. Some families owned no sheep at all or as few as a half dozen, while some wealthy chiefs could count their herds in the thousands. Horses, mules and burros, while not exploited for meat to any great extent, were vital to the economy in allowing the mobility necessary to make full use of the environmental resources, as well as sometimes being trained for running down game. While farming may have been the mainstay of the average family under normal conditions and hunting and gathering the surest methods of surviving when crops failed, husbandry was the most common means of acquiring wealth and a position of prominence within the tribe. Professional skills were also important, however, and medicine men, interpreters, hunt leaders, trading party leaders, war leaders, leather workers and blacksmiths were able to acquire varying degrees of wealth and prestige as a result of these abilities. This encouragement of any endeavor that would be of aid to the tribe allowed for considerable diversification of skills at an early date. It was possible to accumulate wealth either in the form of livestock or of small portable valuables such as jewelry, blankets, buckskins and medicine bundles. While it might frequently be necessary to expend some of this wealth to aid kinsmen, the labor of poor relations and followers would return this investment.

There was no significant change in the size of tribal livestock holdings during the early American period, until the Carson Campaign and the Fort Sumner exile, 1863-68, when the United States effectively used the policy of destroying the economic resources of the tribe in order to defeat it. Fields and orchards suffered most, but the livestock was decimated and exploitation of the remaining herds was minimal, those who still had stock trying to conserve it as capital for rebuilding herds after the war and the release from confinement. When nearly the entire tribe was forced to rely upon hunting and gathering at a time when hostile parties made it impossible to utilize many parts of the country, defeat was inevitable and most Navajos surrendered merely to get something to eat. The Fort Sumner experiment was a dismal failure and the government finally realized that they could not make the Navajos self-supporting again unless they were returned to their own country.

## THE TIME OF TRANSITION, 1868-1880

The Navajos were given a reservation within a portion of their old country and were issued sheep and goats to rebuild their herds. Farming was encouraged and the greater availability of efficient tools allowed for the construction of more dams to store water for stock and more ambitious irrigation projects, both under government supervision and as a result of initiative by local leaders. Herds increased rapidly and farm lands were extended. Much of this productivity was outside of the treaty reservation and in spite of pressure from whites to restrict the Navajos within the area assigned to them, the agents were too poorly financed to be able to enforce the rules and often realized that if they were enforced it would be necessary to return to rationing on a large scale. The usual solution to serious conflicts was to make periodic extensions to the reservation in an effort to create more equitable boundaries between the white settlers and the Navajos.

With peace rather firmly established, trade increased, habitations more convenient to economic resources such as fields were practical and less time was expended in non-productive activities as scouting for enemies. Silversmithing was added to blacksmithing and some skilled workers were able to earn livings by working for whites at trades such as saddle-making and blacksmithing. Some warriors enlisted as scouts in the army and as the Apache wars continued, the need for scouts increased.

## TRADE AND CASH, NEW APPLICATIONS OF OLD CONCEPTS, 1880 TO PRESENT

By the 1880's the crowding of the land began to be felt even more. Hunting declined as an economic endeavor, both because of the greater limits upon movement into hunting areas and because the increased supply of firearms led to virtual extermination of game in some areas. By 1881 it was estimated that it supplied only 5% of the Navajos' subsistence. (Eastman, 1881) As early as 1883 a Navajo agent proposed a program of livestock reduction. (Riordan, 1883)

The most important new factor, however, was the approach of the railroads which brought wage labor in their construction and then allowed the Navajos to trade their products on the national market for a wide variety of the products of an industrial society. Trading posts sprang up throughout the Navajo country. They functioned as markets, banks and employment agencies. Skills such as weaving, smithing and interpreting increased in value. Corn, wool, mutton, hides, rugs and blankets, jewelry, bridle bits and a few other items could be traded for other goods. Gathering declined in this period as the products of the trading post began to supply the variety in diet that was earlier obtained through the utilization of many native resources, but the piñon nuts remained important when traders found a market for it in the east. The effective enforcement of hunting laws in off-reservation areas, beginning about 1900, reduced hunting to an insignificant role. As the population continued to increase the need for more income not dependent upon the land also increased.

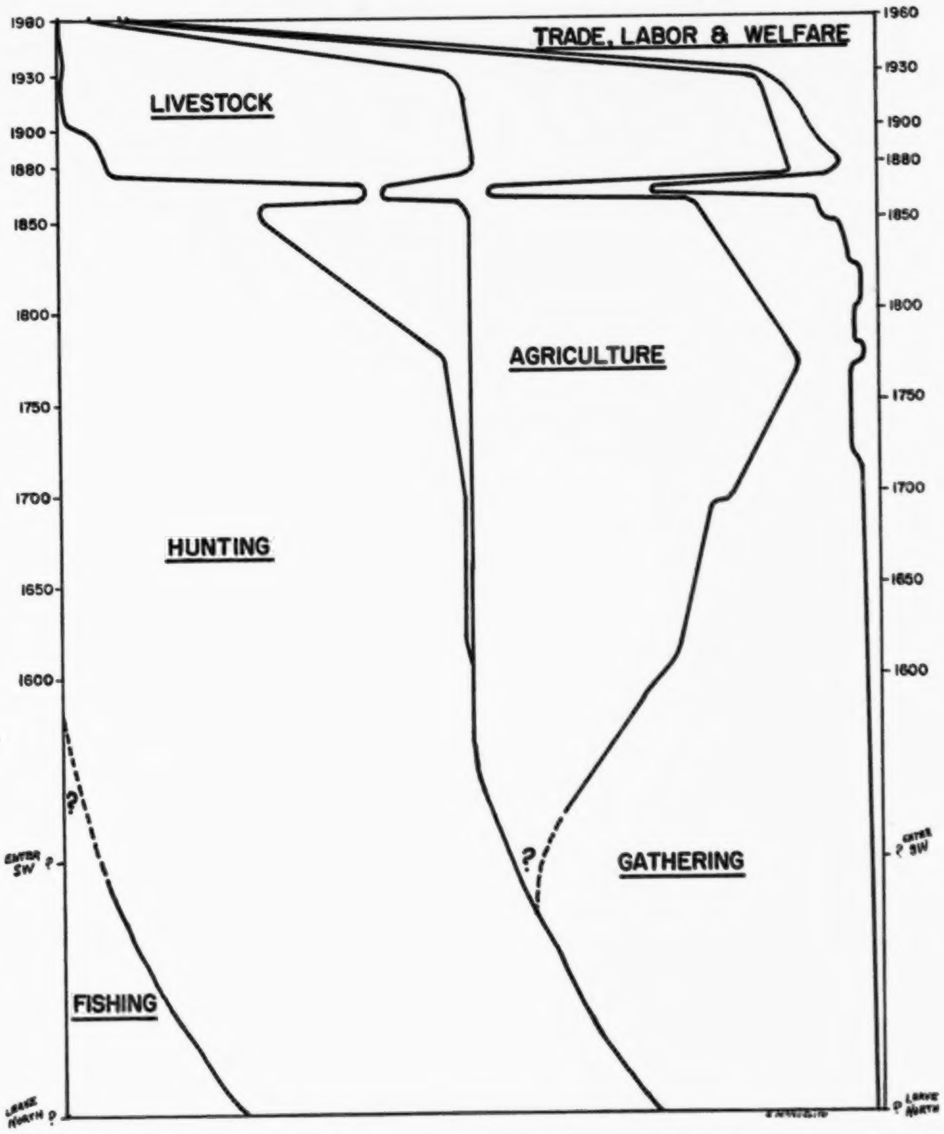

CHART I. Estimated *relative* importance of various aspects of Navajo economy through time. The horizontal scale represents percentage. Income from warfare is included in the "Trade, Labor & Welfare" category. The estimates for the period after 1900 are based primarily upon Young, 1958 and 1961.

The first part of this period may be considered a time when trade was, for the first time, a really major element in Navajo economy. Few Navajo archaeological sites dating after 1880 lack an abundance of trash containing evidence of trade with the Anglo-Americans. (Correll, 1961; Caywood, 1961) While the land produced most of the materials traded to the whites, native skills were employed to increase their value, particularly in weaving. Navajos had long engaged in trade and had developed some simple, but necessary skills, such as those necessary to deal with foreigners and to count and to do simple arithmetic. Wage work increased in importance rather slowly.

The greatest change came with stock reduction in the 1930's. Navajo herds were eventually reduced to less than one-third their previous size. Limited additions to the reservation and expansion of agricultural lands could not make up for this reduction and the rapidly increasing population. Wage labor soon began to be a major factor in Navajo economy. Many Navajos found work in which they could employ old skills for ranchers or farmers in neighboring areas. Some became small-scale contractors who hired other Navajos and built fences for white ranchers. Others learned completely new skills and began to work for the railroads, mines and on construction jobs. With the demand for labor resulting from World War II many found jobs in factories. Skills formerly learned in smithing often helped these Navajos to learn their new jobs more easily. Temporary jobs that allow periodic returns to Navajo country or jobs in rural environments that require less drastic cultural adaptations are preferred, but with the increasing education and experience more Navajos are working at permanent jobs in urban areas.

Tribal income from mineral and other tribally owned resources has, in part, been administered by the Tribal Council for somewhat the same purposes that wealthy headmen once used their resources, in obtaining labor for projects of local improvement, in a welfare program and in a scholarship program. A correlation of functions performed by the Tribal Council with the traditional roles of the early headman is beyond the scope of this paper, but the author is of the opinion that many of the more successful modern programs could be shown to have a relationship, direct or indirect, to native institutions. Administration of cash reserves of this sort has confronted the tribe with many problems that have not been solved, but the overall result has been successful, particularly when compared to the experiences of many other tribes. (Woodbury, 1963)

## CONCLUSIONS

In spite of the fact that there have been rich Navajos throughout most of the period for which information is available and the fact that the tribe as a whole has generally been considered wealthy by other peoples, the per capita income of the average family has probably always been less than it has for most neighboring peoples. The tribal economy has generally allowed a maintenance of population size or even an increase throughout most of its recorded history. Only during the Carson Campaign-Fort Sumner period and possibly in very early historic times when first faced with European weapons and diseases can any decrease in population be postulated. The success of the Navajo economic adjustment is clearly a result of its diversity. This is in turn due to the basic orientation of Navajo culture which gives each individual a great deal of freedom of action, allowing a fuller development and utilization of individual skills and talents, as well as major innovations, and more versatile responses in times of crises.

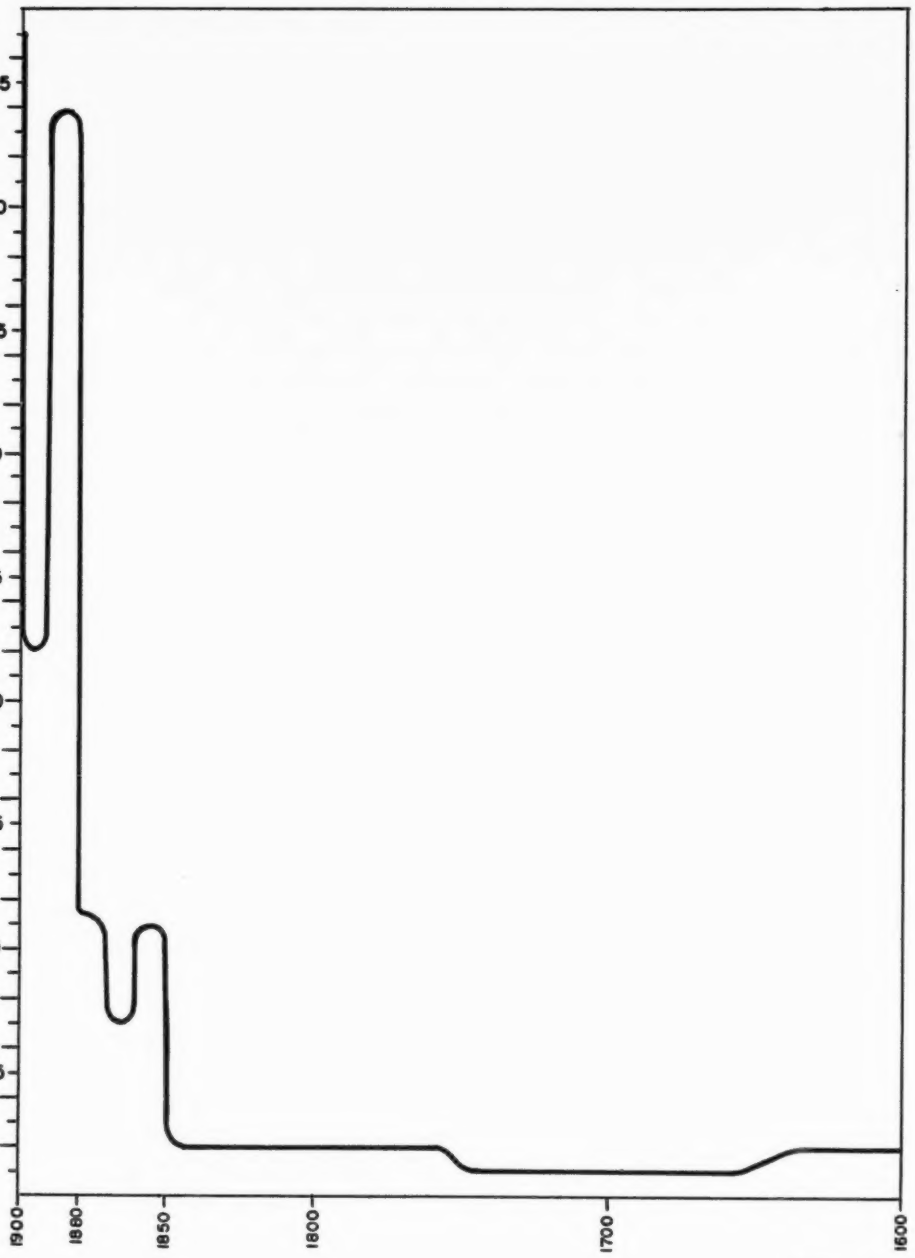

CHART II. Frequency of dated trade items of white manufacture on Navajo archaeological sites, given in absolute numbers of collections. The sources utilized for this chart are Caywood, 1961; Correll, 1961; Hurt, 1942; Keur, 1944; Plowden, 1958.

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# Changes in Land Use among the Western Apaches

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The term Western Apaches includes those groups of Indians now resident on the San Carlos and Fort Apache Reservations in eastern Arizona. The groups involved are the former bands known as the San Carlos, Arivaipa, Apache Peaks, Cibecue, White Mountain, and Tonto. Also included in this discussion are the bands that were known collectively as the Chiricahua.

These Apaches occupied an area that now forms the central, east central, and southeastern portions of the present state of Arizona, the southwestern corner of what is now New Mexico, and extending into the Sierra Madre Mountains in northeastern Sonora and northwestern Chihuahua.

This amounts to a very considerable area of land, including approximately 90,000 square miles. In the total area there is a wide range of ecological diversity. The elevations vary from about 2,000 feet to slightly less than 12,000. Throughout the course of a year these Apaches moved from the Lower Sonoran life zone into the Canadian zone, in the process of utilizing the natural resources. Throughout those parts of the total area that were inhabited by the Apaches and through which they moved frequently, the temperatures range from near zero to well over 100 degrees. There is a similarly great variation in precipitation, from about ten inches annually at the lower elevations to between twenty and thirty inches at the higher altitudes. The flora varies considerably throughout the area, depending on the elevation, from essentially desert types, including a great variety of cacti, to heavily forested mountains.

The changes in land use throughout this varied terrain can be understood best by means of an analysis in terms of historical periods.

## PRE-SPANISH PERIOD

The Apaches and their Athapascan-speaking relatives, the Navajos, came into the Southwest from the northwestern part of Canada and adjacent parts of Alaska. The point in time when they arrived in the Southwest is uncertain, with estimates ranging from A.D. 1000 to 1600.

There is little doubt that when the Apaches did arrive in the Southwest they lived by means of hunting and the gathering of plant products. Therefore, it was essential that they acquire a thorough knowledge of the natural resources available and the most efficient means of using them.

It is possible that they had learned some techniques of cultivation as they moved south through the high plains to the east of the Rocky Mountains. However, this has not been established, and there is some basis for doubt on this point. On the other hand, it is clear that the Apaches did learn about cultivation in the Southwest from the agricultural Pueblo people. Again, there is a question as to the point in time when this knowledge was first acquired by the Apaches, and how rapidly it spread among them. The fact remains, that, no matter when and where they learned the techniques of cultivation, that activity continued to be a supplement to the hunting and gathering done by the Apaches.

## SPANISH-MEXICAN PERIOD, 1600-1870

The first expedition from Mexico into the Southwest was the exploratory one headed by Coronado in 1540-41. However, it was not until Oñate brought his colonizing expedition into the Rio Grande valley in 1598 that the Spanish exerted any lasting effect on the Indian people of the Southwest. Oñate's group established missions, ranches, mines, and new communities in what is now northern New Mexico, with a concentration in the valley of the Rio Grande. A hundred years later Father Kino established his chains of missions in the river valleys of what is now Sonora and southern Arizona.

Some of the southwestern Indians may have had livestock after Coronado was here in 1540-41, but it is certain that after the arrival of Oñate's group the Indians in New Mexico acquired livestock, directly or indirectly, from the Spanish. Nevertheless, the several Indian groups in the Southwest, including the Apaches, continued to exploit the natural resources of the land, along with variant degrees of dependence on livestock.

The techniques of hunting and gathering did not noticeably affect the natural resources. In this type of land use the Indians practiced conservation, not depleting either the flora or fauna in any area. With the development of the limited type of agriculture characteristic of the Western Apaches, the land was still not threatened. Furthermore, it appears that throughout the Spanish-Mexican period the grazing of livestock did not seriously affect the land. The number of head of livestock was not large enough to damage the plant cover.

From at least 1700 on, the Apaches and Navajos became active in raiding the settlements of the Spanish and the sedentary, agriculture-based Indians. During the course of these raids, one of their prime goals was the driving off of livestock, especially cattle and horses. However, the techniques of keeping domesticated animals were not applied by the Indians to such livestock. Therefore, the animals did not increase in numbers in the hands of the Indians, and did not become a burden on the land.

During the Spanish-Mexican period the land was used primarily in three ways.

(1) All the Apache groups used the natural resources supplied by the land in the course of their hunting and gathering activities. The land fulfilled their material needs, such as food, water, clothing, housing, implements, utensils, and weapons, and influenced the nature and development of their socio-political organization, religion, and mythology. Thus, while the Apaches used the land according to their needs, the land, in turn influenced the development of their cultural patterns.

(2) The Apaches, except for the Chiricahuas, did carry on limited farming activities. The areas farmed were at the lower elevations, alongside the washes. Here, the Indians established permanent base camps. Even bands such as the White Mountain and Cibecue, that claimed lands at the higher elevations, maintained winter camps at the lowest elevations possible. From the low altitude winter camps the majority of each local group moved out over the surrounding countryside in the spring, usually after the corn, wheat, beans, and squash had been planted. The old people, those incapacitated, and small children remained at the winter camp site to give the growing crops

some protection and a small amount of cultivation. The others in each camp group moved through successively higher elevations during the late spring and summer as various plants reached maturity. Always the principle of conservation of plants and animals was observed by the Apaches. With the waning of summer, the people gradually worked their way back to the winter camp sites. They carried as much foodstuff with them as possible. Additional supplies of food were stored in convenient places that could be reached during the fall and winter. At the base camps, the crops had been harvested by those who remained there during the summer or were harvested when the others returned in late summer or early fall. Hunting of game was carried on through the winter.

(3) The land also served as a base of operations for the raiding activities of the Apaches. Although raids might be, and were, made at any time, they were most likely to develop during the fall, winter, and early spring. These were the periods of time when subsistence activities were at a minimum, when food supplies might be running low, and when the men would have time on their hands.

This basic three-fold pattern of Western Apache land uses continued through the Spanish period in the Southwest. There was some abatement of the raiding activities on northern Sonora and Chihuahua from 1786 until approximately 1810. In 1786 a Spaniard by the name of Galvez was assigned control of Spanish operations in northern Sonora and Chihuahua. He established the policy of providing food, liquor, and other supplies to Apaches who would settle around the Spanish communities, especially around the presidios, their forts. The Spanish supplied the Apaches with poor quality firearms, and then promoted dissensions among them, with the idea that the Indians would use their weapons on each other. Galvez' total policy did foster peaceful relationships with those Apaches around the presidios, until about 1810 when the Spanish government was no longer able to carry the financial burden. When this policy ceased to operate, those Apaches who had been benefiting thereby resumed their raiding activities. These raids continued after the Mexican revolution.

One of the stipulations of the treaty that ended the war between Mexico and the United States was that the latter country would prevent Indians resident in its newly acquired territory from making raids into Mexico. This agreement was easier made than kept. In spite of campaigns against the Apaches by military forces of the United States, almost forty years were to elapse before the raids were stopped. Raiding had become a part of the Apache culture pattern, and it was incomprehensible to them that they should stop raiding, especially that they should not raid Mexicans.

## PERIOD OF 1870-1900

By 1870 the government of the United States began establishing reservation areas for the various Indian groups in what is now New Mexico and Arizona. These reservations were portions of the larger areas over which the various Indian tribes had formerly ranged. They were areas where the Indians could be concentrated and controlled by United States military personnel. Actually, only small portions of the total areas set aside as Apache reservations were used for quite some period of time, because of the policy of concentrating the Indians.

This policy of concentrating large numbers of Apaches into specified small areas made it essentially impossible for these Indians to practice the previous basic uses of the land to the extent that they had formerly. It was possible for them to do only a very limited amount of hunting and gathering. They could no longer occupy the old farming sites. They were dislocated, disheartened, and confused. Former units of social organization were somewhat shattered, and people were crowded in alongside other people who were essentially strangers. With all the crowding there was not sufficient land available in the areas of concentration for farming, even if the Apaches had been interested and willing to farm. And, of course, raiding was gradually brought to a halt.

All of these complications made it necessary for the government of the United States to provide rations of food, clothing, and bedding for the Apaches. This program of issuing rations developed a paternalistic relationship between the Apaches and the government of the United States. The Indians, concentrated against their will, came to depend on the United States to provide them with the necessities of life. For about three decades the government of the United States was willing to provide the basic necessities of life for the Apaches in order to keep them quietly on the reservations. Then pressure became heavy on the part of Congress and the taxpayers of the United States to get all Indians on a self-sufficient basis at the earliest moment possible.

Within a few years after the establishment of the reservations for the Western Apaches, some of the Indians began to accumulate livestock, especially cattle. The number of head of cattle was small for a long period of time. Therefore, the reservation ranges were not visibly affected by Indian cattle.

However, beginning in 1892 cattle owned by White ranchers located in areas adjacent to the San Carlos Reservation and its Fort Apache subdivision began grazing on the reservation ranges. The Department of the Interior, through its Bureau of Indian Affairs, decided to permit the White ranchers to graze their cattle on the reservation ranges, but to charge them grazing fees based on the number of head of cattle, and horses. It was impossible for the field personnel of the Bureau of Indian Affairs to adequately patrol the ranges and inspect the number of head of livestock being grazed by the White ranchers on the reservation ranges. Occasional inspections by the field personnel indicated that the number of head of livestock being grazed on the reservation ranges far exceeded the permits and the grazing fees that were paid. The fact that the reservation lands were not fenced made it impossible to graze livestock on or off the reservation areas at the will of the White owners. The overstocking of the reservations ranges meant heavy overgrazing of the available forage.

Once the Apaches had settled down to reservation life attempts were made by the government agents in charge to induce the Indians to engage in farming. The Chiricahuas had never done any farming and could not be persuaded to do so. In the general Fort Apache area farming apparently remained relatively unimportant during most of the time from 1870 to 1900. The annual reports of the superintendent at San Carlos during that period of time indicate that anywhere from 40 to 2,800 acres were cultivated by the Apaches on that reservation.

Three factors operated to offset the efforts at farming made by the Indians on the San Carlos reservation. (1) Along the Gila and San Carlos rivers it was necessary to irrigate the cultivated areas. Almost every year the irrigation ditches, dug by the Apaches, were washed out by floods, as were the fields. The year 1916 was particularly bad in this respect. (2) Around the turn of the century White farmers east of the San Carlos Reservation began taking large quantities of water from the Gila River for the irrigation of their crops. This meant that less water was available for irrigation on the reservation. (3) In a personal communication( dated March 27, 1964, the superintendent at San Carlos, Mr. Charles J. Rives, states that:

> Efforts by the Indian Agency to provide water by pumps resulted in keeping the farming activity going. But the construction of Coolidge Dam and the removal of the farmers from their best lands served to discourage them further. Others were discouraged because new lands to replace those taken for the reservoir were insufficient to go around. The farmers elimination was completed by the division of newly developed lands into two-acre garden plots. Over the years the Apaches have found that two acres is too small to farm and too large to garden.

## PERIOD FROM 1900 TO 1935

Despite the lack of interest on the part of the Apaches, Indian Service personnel continued their efforts—generally futile—to encourage farming.

The major parts of the San Carlos and Fort Apache reservations were used from 1900 on by the White cattle ranchers who had grazing permits on the two reservations. However, in 1923 a superintendent took charge at San Carlos whose principal idea was to remove the cattle owned by the White ranchers from the reservation ranges and expand the Indian cattle industry. Beginning in 1925, leases to White cattlemen were not renewed, and the last White permit was terminated in 1938.

## 1935 TO THE PRESENT

The Apache cattlemen did spread their stock over the reservation ranges, and soon formed associations of individual owners. On the San Carlos reservation eleven associations were formed. Each one of these associations occupied a range formerly used by a White lessee. In addition there were two ranges occupied by tribally-owned herds. Some of these associations proved to be too small and economically unsound. Therefore, as a result of joint conferences involving representatives of the San Carlos Tribal Government and the Bureau of Indian Affairs, action was initiated in 1956 which has resulted in the reorganization of the original eleven associations into five larger and more efficient units. Similar consolidations of associations occurred on the Fort Apache Reservation.

The reservation ranges were seriously overgrazed during the period of Anglo leases. Overgrazing and other improper and inefficient range practices have continued through most of the time that the Indian associations have been operating. However, continuing improvements have been made in range usage in recent years, including more and better fencing, more efficient use of forage, the development of stock water supplies, and the elimination of water-consuming flora, such as the junipers.

There has been a limited revival of farming on both the San Carlos and Fort Apache reservations. On the San Carlos Reservation the farming is being done by the tribe as a corporation. Individual farming is almost nonexistent. As the Superintendent at San Carlos pointed out in his letter of

March 27, 1964, regarding current land use on that reservation, "Progress has been noted in higher production through more intensive and efficient management and operation." He further states that, "The big change in land use is the increase in grazing use . . . and the decrease in farming starting in the 1920s."

The major categories of land use on the San Carlos and Fort Apache Reservations in 1963 are indicated by the following figures, given in acres.

| | SAN CARLOS | FORT APACHE |
|---|---|---|
| Forested (commercial) | 117,457 | 717,630 |
| Forested (non-commercial) | 330,449 | 375,573 |
| Rangeland (open) | 1,417,169 | 560,271 |
| Farmland (potential) | 2,363 | 5,098 |
| Other uses | — | 6,300 |
| Total acres | 1,867,438 | 1,664,872 |

In regard to the above figures, forested acres also provide grazing. Also, the figure for other uses on the Fort Apache Reservation includes areas being developed as recreational areas.

The actual usage of farmland and forested areas on the two Apache reservations is indicated by the following figures, supplied by the Agencies on the reservations.

## FORT APACHE

1. Acreage of Indian land farmed in 1963.
    a. 2,885 acres were farmed by individual Indians.
    b. Size of individual Indian farms range from ¼ to 30 acres.
    c. None is farmed by the tribal government.
    d. No farmlands are leased to non-Indians.
2. Beginning of the cutting of timber.
    a. Non-commercial cutting for use on the reservation started with the army, at Fort Apache in 1871.
    b. Commercial cutting started about 1918.
3. Amount of timber cut in 1963.
    a. 4,214,000 board feet cut for reservation use.
    b. 70,355,000 board feet cut by commercial outfits.

## SAN CARLOS

1. Acreage of Indian land farmed in 1963.
    a. The individual farmer is essentially non-existent.
    b. 600 acres were farmed by the San Carlos tribal government as a corporation.
    c. No farmlands are leased to non-Indians.
2. Beginning of the cutting of timber.
    a. Available records indicate only that non-commercial cutting was started by the army sometime prior to 1920.
    b. Commercial cutting started in 1953.
3. Amount of timber cut in 1963.
    a. None was cut non-commercially for reservation use.
    b. 14,000,000 board feet cut by commercial outfits.

On both reservations timber is being cut on a supervised, sustained-yield basis.

Stated briefly, the changes in land use in the areas occupied by the Western Apaches have been the following:

(1) Early hunting and gathering activities of the Indians, which did not damage the land and its resources.

(2) Development of limited agriculture by the Indians; also resulting in no damage to the land.

(3) Acquisition of a limited amount of livestock through raids; still no damage to the land.

(4) Establishment of the reservations, and the concentration of the Apaches in small areas for a number of years. During this time very little use was made of the land.

(5) The leasing of reservation ranges to White cattlemen, which resulted in heavy overgrazing and serious damage to the land.

(6) Releasing the reservation ranges for use by Indian cattlemen, with continued overgrazing of the land for a period of time.

(7) The recent improvement of range practices by the Indian cattle associations. Continued lack of interest in farming.

(8) Leasing of timber resources to commercial outfits, for supervised, sustained-yield cutting.

(9) The present activity in developing suitable areas of reservation lands for recreational purposes, in order to attract tourists.

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# Changes in Land Use among the Navajo Indians in the Many Farms Area of the Navajo Reservation[1]

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## INTRODUCTION

Changes in land use in the Many Farms area[2] on the Navajo Reservation has been the result of numerous factors including the climatic, economic, sociocultural, contact with non-Indians and through intervention by the Bureau of Indian Affairs. The purpose of this paper is to trace these influences on land use by the Navajo residents from 1880 through 1961.

Many Farms is located in northern Arizona and is in the approximate geographic center of the Navajo Reservation. The area under consideration comprises 700 square miles (of 24,181 square miles for the total Reservation), with its widest points, 20 miles north to south, and 40 miles east to west.

The climate is characteristic of desert areas with temperatures in winter averaging 25 degrees F. (in 1960-61) and in summer it ranges from a high of 110 degrees in the day and dropping 40 or more degrees at night. Strong winds and sandstorms occur in the late spring and are followed by cloudbursts in early and again in late summer.

Rainfall averages 12 to 15 inches per year with the valley regions getting less than the maximum. On either side of the valley, the land rises 500 to 1,000 feet into mesa country. The highest and most sparsely settled section is Black Mountain which borders the western boundary of the Many Farms area. This is ponderosa pine country with grassy meadows that can support larger flocks of sheep than any other part of this area.

The population consists of about 2300 persons with the major concentration of three to five hundred, varying with the season, living in the irrigated valley. The remainder is scattered throughout the countryside in clusters of families, termed camps, of which there is a total of 143.

Three trading posts, two schools, a government irrigation compound and, until June, the Cornell University Medical College clinic were the non-Indian facilities serving the people.

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[1] The data were obtained by the writer during the summers of 1958 through 1961, and by Don Reeder, resident anthropologist for the Cornell University Medical College, 1957-1959. The writer is indebted to the Bureau of Indian Affairs for making available its records and reports.

[2] The Many Farms area is an arbitrarily defined section of the Navajo Reservation including the communities of Rough Rock, Black Mountain, Valley Store, and Many Farms. It includes parts of three administrative districts as defined by the Bureau of Indian Affairs.

## CHANGING LAND USE

The sheep raising seminomadic bands of Navajos roamed the Many Farms area long before their confinement at Fort Sumner in 1864. However, its use as a major grazing area did not begin until the 1880's when the Navajo began acquiring large herds of livestock.

The area reached its economic peak at the turn of the century. Besides the many large herds of cattle, sheep, and horses, there was some agriculture to furnish cereal and fruits.

The large herds of livestock rapidly depleted the range. In the drought period that followed range grasses soon gave way to less nutritious weeds, shrubs, and unedible grasses. By 1915 the era of unlimited grazing was over. The population was increasing also and many Navajos turned more and more to agriculture.

At the turn of the century the Government installed an irrigation system at Wheatfields, 30 miles southeast of Many Farms. This project, around 1920, furnished the pattern for the first Many Farms Irrigation Project. Initially, the old flood water fields were enlarged; soon diversion dams and ditches were in use and more fields were cleared for agricultural production.

By 1925 a main ditch was dug to lead the water from the Chinle wash to the fields. The technique used was the bolsa system: water was turned into the fields through the winter and spring run-off season, and there contained in two to three foot dykes. This method of irrigation soaked the fields sufficiently to establish the crop and carry it through to the summer rains.

Throughout this period of expanding agriculture and shrinking herds increasing numbers of men found it necessary to work for wages. However, the basic economy was still sheepherding and agriculture. The families maintained permanent homes in the highlands, where the best pasture was to be found, and erected temporary shades and shelters in the valley during the planting and harvest seasons.

The government stock reservation program of the 1930's together with a severe drought in 1931 and 1932, brought an end to the livestock era. Some residents felt that the drought only completed the steady deterioration of the range and made continued grazing impossible. Others, generally those who had access to more favorable grazing areas, say that it was the stock reduction program. The decade of the 1930's was one of severe economic dislocation.

The United States Government attempted to curb the economic crisis by initiating a series of public works programs including road building, construction of soil conservation structures, and erection and expansion of government buildings.

One of the most extensive (in terms of funds spent) of the Government projects during the 1930's was the construction and operation of the United States Government Cannery. Begun in 1937, the cannery and slaughterhouse was in operation the following year, canning and packing meat from animals slaughtered in the reduction program. The cannery purchased sheep and cattle and the processed meat was distributed to Indian Service Installations throughout the Southwest. Several years later a tannery was constructed. However, it was never fully put to use. The cannery ceased operation in 1942 and the building was converted into classrooms. The cannery building remained vacant until 1945, when the Government organized the Many Farms Store Cooperative which closed its doors in 1955.

In 1938 the Government began construction of the present dam, reservoir, and field system. This project, like others which developed concurrently with the stock reduction program, was subjected to community controversy, with factions developing which argued for or against the project. Those against the construction objected mainly because of the belief that the Indians had not been consulted before the dam was started; and because of the general anti-Government sentiment existing at that time.

In 1943 construction of the reservoir with a storage capacity for approximately 24,000 acre feet of water was completed and eventually 1,406 acres of land was placed under the irrigation system. Water for the reservoir flows from the Chinle watershed with the bulk of the water being supplied by melting snow from the Chuska range. In 1944 the first fields were ready for operation. By 1947 the system was functioning well for the government to begin assessing water charges to pay for the maintenance of the main ditches and the dam.

In addition to providing the new fields and the dam, the Government instituted an extension education program to furnish technical assistance. Through this program the Navajos were able to obtain expert advice on farming techniques, marketing and on the selection of the most advantageous crops. Alfalfa, corn, beans, wheat, oats, barley, melons, and squash and fruit trees were planted. Alfalfa was the major cash crop since the price per bale in this arid region is four to five times what it would be in more fertile areas, yet the cost of raising and preparing hay is the same.

In 1949 the reservoir was filled to the overflow, and the Many Farms irrigation project enjoyed its peak year. Outmoded techniques of corn planting, insufficient care of ditches, and lack of weed control lowered production but the yield was high in comparison with similar Navajo projects located elsewhere. In 1950 and 1951 the entire Southwest suffered severe drought and the Many Farms was seriously affected. The spring winds ruined the fruit trees and filled ditches and field corrugation with sand. Of 1,400 acres of land which included 154 plots, and which could be activated with the use of tractors and modern agricultural methods, less than one half of the more productive land was felt to lend itself to conventional Navajo methods of planting and cultivation. Since 1940 permeability of water into soil was affected with compact zones formed from 0 to 8 inches in depth throughout the project, largely as a result of shallow plowing by the use of horse-drawn equipment. Thus, there existed poor surface penetration.

Besides the negative effects of native farming practices on the soil, climatic factors were responsible for ever-decreasing water supply. The Southwest in general endured a period of severe drought in 1950-51, and the Many Farms area was seriously affected. The last full alfalfa harvest was in 1953; after that season there was not enough water for the crops and some fields were plowed up and planted to corn, beans, and squash for home consumption. Farmers abandoned their fields and sought wage labor. In the summer of 1956 the storage in the reservoir (1,800 acre feet) was inadequate to supply water to the farms and no crops were planted.

By 1956 through soil analysis, Navajo experience in farming poor soil, the drought, it became apparent that 510 acres of the southwest part of the irrigated area classified as IV land was not suitable for farming and the Branch of Land Operation recommended that it be returned to grazing use. In April 1957 the Many Farms Land Board received requests for delivery of irrigation water to 58 acres of land located outside of the project, presumably because the soil was better. Thirteen cooperators made the request.

In 1959 the reservoir, with a storage capacity of 24,000 acre feet of water, contained 14,000, enabling 64 farmers to cultivate 642 acres. During the succeeding years through 1961 this level of cultivation was maintained.

In addition to farming assigned irrigated land, local residents planted crops on the reservoir bed, with acreage varying from year to year depending upon the extent to which the reservoir was filled. In some years the fields were double-cropped so that, for example, in 1955 over 400 acres were under cultivation. Yields from the fertile soil were as much as four times greater for some items than production per acre from irrigated land.

Plots in the reservoir bed were not assigned but were considered to belong to the farmer working the particular field. The general practice among these people was to plant the crop, to leave for wage work or for their summer sheep camps on the higher mesa, and to return to the fields to harvest their crop in the fall. Intermittently throughout the summer some families visited their fields to hoe the weeds.

The various forces—drought, government intervention, economic uncertainties, sociocultural practices, have been influential in altering the Navajos' use of land related to their subsistence activities. In addition to those shifts mentioned, migratory agricultural work, non-agricultural employment on the Reservation and work projects sponsored by the tribe were sources of income in recent years. One hundred three individuals (9 percent of the population 14 years and over) from 46 camps (32 percent of the resident camps) were members of the migratory pool in 1961. In the same year, 42 individuals obtained part-time or temporary construction jobs with the tribe, private contractors, or local traders.

These activities have had a marked effect upon the settlement pattern of the residents in this area. While Navajos may maintain several residences, a winter and as many as several summer camps, there has been a steady movement of families into the valley. Residential establishment is patterned with individual families moving in with kinfolks, and eventually building their own houses or *hogans* close by. Living in the valley, close to trading posts and to the highway, enables the Navajo to hear about work opportunities which would be unknown to them otherwise. Abandoned farms and otherwise idle land are used for this purpose.

## SUMMARY

This paper has traced the changing land use among the Many Farms Navajo. The influences have been the climatic, economic, sociocultural factors and innovations initiated by the Federal Government. The major shift has been the abandonment of grazing land and sheep husbandry to a few as the result of drought condition and the stock reduction program to farming in the valley made possible by the construction of a dam and a system of irrigation canals. Agriculture, dependent upon water from the reservoir, which in turn has as its source of water supply rain and snow in the nearby mountains, has been highly unpredictable. Poor soil condition and Navajo agricultural practices have rendered over half of the irrigable land useless. Unproductive farm plots and otherwise useless land in the valley have been taken up by migratory workers, individuals with temporary jobs on and off the Reservation.

# Changes in Land Tenure and Useage among the Indians and Spanish Americans in Northern New Mexico

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## INTRODUCTION

The aim of this paper is to describe in brief compass the changes in patterns of land ownership and usage among the Indians and Spanish Americans of northern New Mexico, together with the causes of such changes, since 1846, when this area came under the control of the United States. Included in the study is the northern half of the present state of New Mexico, or approximately that area embraced in the counties north of and including Valencia, Torrance, Guadalupe and Quay Counties. In this distinctly tri-cultural area are the majority of the original Spanish and Mexican land grants and all of the present New Mexico Indian tribes except the Mescalero Apaches.

## PUEBLO INDIANS

First we turn our attention to the Pueblo Indian tribes, so called because they have lived for centuries in settled communities or *pueblos*. There are nineteen Pueblo groups recognized today, and their ancestors have lived in this general area of New Mexico for hundreds if not thousands of years. All of the land was theirs, as far as they could make use of it, until the arrival of the roving tribes of Plains Indians between 1100 and 1300 A.D., and the Spanish explorers and settlers in the sixteenth and seventeenth centuries.

Among the various Indian groups before the coming of the white man the idea of private ownership of land probably did not exist. There was sufficient land for all, and conflicts arose, when they did, over the use of hunting grounds or in connection with the sacking of Pueblo communities by the roving tribes.

Under Spanish colonial rule the Indian Pueblos were granted land holdings by the Spanish crown, and rules for guardianship of the Indian tribes and protection of their land grants were instituted. These Pueblo grants were usually two leagues square, with the Indian settlement and church at the center, and embraced their irrigated fields and part, if not all, of their grazing land.

In the period following the Mexican Revolution, from 1821 to 1848, the Mexican government recognized the Indian Pueblo grants, but evidenced little regard for the guardianship regulations designed to hold the Indian lands intact for the tribes. No individual Indian held title to any part of the land grant, for the lands were held as communal tribal property. Nevertheless there were many cases of illegal alienation of Pueblo land. Often the

Pueblo Indians encouraged Spanish settlers to move in on Pueblo grant land near the Indian village to provide added protection from the marauding Plains Indians. In other cases, individual Indians would trade or sell their land to Spanish settlers, assuming that title was conveyed in the transaction. As a result, sizeable Spanish settlements grew up on the land of some of the Pueblo grants.

When, two years after the occupation of New Mexico by United States troops in 1846, rule of New Mexico by the United States was confirmed by the Treaty of Guadalupe Hidalgo in 1848, the new government assumed under the terms of this treaty, the responsibility of recognizing and protecting the rights of the Pueblo Indians in the land grants made to them under Spanish rule and continued under Mexican rule. However, the territorial courts held for the first two generations of United States rule that the Pueblo Indians could alienate their lands, because they were held to be citizens and not wards of the government.

During the period from 1848 to 1913 more and more non-Indians, principally Spanish Americans, occupied Pueblo Indian grant lands and claimed title to portions thereof. The non-Indian claims were especially numerous on the Isleta, Nambe, Picuris, Pojoaque, San Felipe, San Idlefonso, San Juan, Santa Clara and Taos Pueblo grants, mainly because these offered the most desirable farming or grazing lands.

It was not until 1913 that the Supreme Court reversed itself and declared the Pueblo Indians to be wards of the government, and therefore incapable of alienating their lands. Non-Indians who has occupied Indian land found themselve without title to their land.

Finally, in 1925, the Pueblo Lands Board established by Congress began the investigation of each non-Indian land claim. Where adverse occupation, with payment of taxes, had continued for 35 years without color of title, or for 22 years with color of title, the United States issued a patent to the non-Indian land holder. For these lands lost to them the Indian tribes were compensated by the government, and replacement lands were purchased by the Pueblo tribes in several instances. In addition the land holdings of the Pueblo Indians were increased between 1900 and 1940 by Executive Orders, acts of Congress or Resettlement Administration purchase, with the aim of restoring to the Pueblo Indians some adequacy and security in their land holdings.

Within the Pueblo tribe, by custom and practice, land usage for dwelling sites and farming use by individuals and families, through assignment by the tribe, is almost equal to land ownership, with the restriction that the land cannot be sold outside the tribe. Usage of the land is passed to descendants or heirs by inheritance, and with tribal consent usage can often be exchanged within the tribe. Grazing and timber land is usually held in common by the tribe, with tribal assignment of usage to individuals.

No Indian tribe in New Mexico has terminated the tribal ownership of land in favor of individual allotment ownership with the individual's right to alienate his land. The only restriction imposed upon the Indians by the federal government is this upon his right to alienate his land.

The Pueblo Indians use their land generally in much the same was as they have for generations, that is, for small farming activities and for grazing of livestock. With the increase of Indian population the average size of irrigated farm plots now ranges from 12 acres per capita for the Sandia

Pueblo down to ½ acre per capita for the Laguna Pueblo. Grazing land has suffered from overgrazing and erosion. As a result the land base in all of the Pueblos is inadequate both in grazing and crop land to support the increasing numbers in the tribes. Thus there is increased dependance upon wage work away from the Pueblo or in nearby towns or upon welfare assistance.

## NAVAJO

When we turn to the Navajo Indians we discover that land tenure and use changed markedly after the Navajos returned to northwestern New Mexico and northeastern Arizona in 1868, to begin reservation life after the concentration camp experience at Fort Sumner, New Mexico, where they had been driven in 1863, by Colonel Kit Carson. Before 1863 the Navajos had roved over the northwestern New Mexico and adjacent areas, staging sporadic raids on the Pueblo Indians and Spanish colonial settlements.

In 1868 the Navajos signed a treaty with the United States, in which they agreed to remain on a reservation set aside in the Navajo country and the United States agreed to provide certain economic and educational assistance. The original reservation contained about 3,500,000 acres, but subsequent enlargement have brought it to the present total of 11,500,000 acres, of which 3,442,671 acres lie in New Mexico, with the remainder in Arizona.

Livestock raising, with major emphasis on sheep raising, has been the chief means of livelihood for the Navajos, with the weaving of blankets from native wool as a related source of income. For some Navajos additional income was derived from jewelry making. The population increase has brought increase of grazing pressure on the land, and the Navajo land base, even with large increases of acreage, has proven inadequate in quality to support the Indian population.

Work projects on the reservation, relocation efforts to place Navajos in jobs in distant cities and individual jobs off the reservation do not suffice to fill the economic gap. The Navajos still tend to live in widely scattered and isolated family groupings rather than in gathered communities. Government efforts to save the land by reducing the sheep quotas a generation ago, and to train the Navajos for farming life have met with opposition. At the present time the Navajo Irrigation Project, northeast of Farmington, is being completed for the relocation of 1,120 Navajo families on irrigated farms, as a large scale pioneer effort.

## JICARILLA APACHE

The last Indian group to be considered is the Jicarilla Apache tribe, one of the two Apache groups in New Mexico at present. Prior to 1887 the Jicarilla Apaches roamed over the Southwest with other roving tribes, but in that year they were settled on a reservation extending south from the Colorado border, a little west of the center of northern New Mexico. The reservation was enlarged in 1907, 1908 and 1940, to its present size of 742,303 acres. During the nineteenth century or earlier the Jicarilla Apaches borrowed agricultural practices from their Pueblo neighbors, including the cultivation of corn, wheat, pumpkin, peas and tobacco. Small farming and stockraising have been the chief forms of livelihood for these Indians, but more recently tribal income from timber sales and oil and gas leases has been divided among the members of the tribe in per capita payments, beginning on June 1, 1952, and ranging from $300 to $750 per individual annually since then.

Farming and livestock raising have decreased since 1951, indicating that the people are not using the land as they used to, but are depending more on tribal payments and government assistance. In 1956 over two thirds of all personal income reported for Jicarilla Apache came from the per capita payments. Over 90% of the tribe's 1,217 members live within ten miles of Dulce, New Mexico, the agency headquarters, although the reservation embraces an average of 600 acres for each member of the tribe.

The Jicarilla Apache tribe now has funds sufficient for financing a large scale development program to seek to increase the productivity of tribal resources through irrigation of land, survey and improvement of range capacity, better utilization of forest lands, development of sub-surface resources and building of recreational facilities. As long as the tribal payments to members continue the above efforts may not turn many Jicarilla Apaches back to larger use of the land.

## SPANISH AMERICANS

As we leave the Indian groups to consider the Spanish Americans in northern New Mexico, we discover that land ownership among these people usually derived through inheritance from Spanish or Mexican land grants made by the King of Spain or the rulers of Mexico prior to 1846. Besides the grant to the Indian Pueblos three distinct types of land grants were made by the Spanish crown.

Grants were made to communities of settlers, large grants were made to influential individuals, and grants were made to land investors (*empresarios*) for the purpose of encouraging settlement in new territory.

When a community land grant was made the settlers received *solares* or home building sites in the village proper, usually distributed by lot, and *suertes* or agricultural plots of irrigated land along the nearby stream. These two kinds of tracts were usually individually owned.

The settlers used in common the *ejidos* or village commons of grazing and timber lands that comprised the remainder of the grant and the *dehesas* or community pastures. Boundaries of the grants were usually vague and unsurveyed.

These farm villages on such grants became self-sufficient units, with grains, vegetables and meat raised locally and deer and antelope hunted nearby. Taxation, under Spanish and Mexican rule, was not on the land itself, but on its productive capacity, and taxes were usually paid in kind.

Some changes had begun to occur before 1846 that affected the land and its use. Spanish custom called for the division of the land through inheritance among all the heirs, so that population increase resulted in the slicing of farm holdings into ever smaller slices with each succeeding generation. This same population increase, together with the gradual removal of the danger of Indian raids, led the Spanish settlers to move outward from the villages along the middle Rio Grande to clusters of farm villages along the mountain streams into the Rio Grande, to villages along the upper Rio Grande in southern Colorado, and to new settlements and ranches on the plains east and southeast of the Sangre de Cristo Mountains. It has been concluded that most of the arable land in northcentral New Mexico was under irrigation before 1680, and in many cases the Spanish took over land that had been irrigated by Indians earlier. Before 1846 and for some years thereafter Spanish-speaking stock raisers spread over eastern New

Mexico and into southeastern Colorado and the Oklahoma and Texas panhandle areas. Since this was mainly subsistence ranching there was little overgrazing of the ranges.

United States occupation of New Mexico in 1846, followed by United States rule in 1848, began the processes that led to (1) the decrease of Spanish-American land holdings, (2) the marked changes in land use that accompanied the deterioration of Spanish American agriculture, and (3) the reduction in non-owned land available for Spanish American use.

As we proceed to describe these changes we note first that the establishment of New Mexico as a territory of the United Staes in 1850 was accompanied by the institution of the county system of precise registration of land titles and the practice of land taxation with taxes to be paid in money. Parts or all of many of the land grants were soon lost to the owners through delinquent tax sales. The advent of a money economy in place of the customary barter economy brought with it the credit system, which led to the loss of more land through foreclosures.

Aggressive, commercially-oriented Anglo ranchers pushed the Spanish American stock raisers off of the plains of eastern New Mexico and back toward the mountain villages. Groups or rings of land stealers, aided by unscrupulous lawyers, took huge areas of the grant lands and adjacent public domain through fraudulent lawsuits and overreaching surveys, frequently leaving the Spanish Americans only their homes and small farms, or sometimes ultimately evicting them from these. The two million acres of community grant lands confirmed by the United States had shrunk to 300,000 acres by 1930. The land grabbers took added advantage of the illiteracy of the Spanish Americans. Timber land taken by the land grabbers was cut over and later sold to the National Forest or abandoned to tax delinquency. In recent years tracts of remaining Spanish American ranch lands have been bought by Texans for tax write-off purposes.

Several factors have combined to bring about a deterioration in agriculture that has resulted in marked changes in land use. By the time the railroads built into New Mexico in 1880 farm production was insufficient to meet the needs of the population and many men sought work in railroad construction and maintenance or other wage work, often outside New Mexico. Inefficient farming methods were leading to soil depletion and soil erosion. Overgrazing in the mountains opened the way for destructive soil erosion in the watersheds, causing water shortages in the critical summer growing season. Antiquated irrigation systems wasted much of the precious water and compounded the water shortage. The increasing complextiy of water use agreements and compacts brought stiffer competition for the limited supply of water.

Migratory labor jobs began to appear more profitable than farming. Mechanized farming in the rest of the country made farming in northern New Mexico less productive and less profitable by comparison. The distance to markets discouraged truck gardening.

Improved education has prepared many Spanish Americans for jobs or professions in other parts of the country, and increased out-migration has left many houses vacant and small farms idle. The rise in American living standards has led the Spanish Americans to want more than a small farm could provide, so that there are few who subsist today on income exclusively from their farms. Many former farms in the mountain valleys are being sold for summer cabin sites.

Land that was outside the land grants in 1848 became public domain and might have provided expansion room for the Spanish Americans, but the time soon came when it was no longer available. Railroads were granted hundreds of square miles of land along the right of way to encourage their construction. Homesteading by Anglo new comers pre-empted much of the public domain. Failures in dry farming led to later abandonment of many homesteads, which were quickly taken over by Anglo ranchers. Timber lands in the public domain were transferred to National Forests. Grazing on the National Forest land was controlled and decreased to protect the already severly damaged watersheds.

The typical Spanish American in northern New Mexico today still owns his adobe home in his native mountain village, with 3 to 12 acres of irrigated farm land or pasture nearby. The timber land or grazing land that used to belong to his community has been lost years ago. He farms his little plot more or less seriously or rents it to a farmer neighbor, but depends on part time work or full time work for most of the family income.

If he is better prepared or more fortunate than his neighbors or has more political influence he may have a regular full time job at home or in a nearby city, to which he may commute daily, and he probably applies some of the extra income to the improvement of his home and farm. If he is less fortunate or if the family has no breadwinner then part or all of the family's sustenance is provided through welfare channels. Since the Great Depression, when hordes of unemployed Spanish Americans returned to their native villages, relief and welfare programs have been necessary to meet the added needs in this overpopulated area. The land that remains in the ownership of and for the use of the Spanish Americans in northern New Mexico is inadequate in acreage and resources to fill the needs of these people.

There is a need for land use cooperatives, irrigation improvement, better soil and water conservation practices and more readily available farm loans in this area if conditions are to be improved. There is also a need for continued encouragement of the people to make the fullest use of their resources and to reach toward the kind of initiative that will lead them away from their customary dependency.

# The Human Dimensions in Land Use and Land Displacement in Northern New Mexico Villages

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> *One generation passeth away, and another generation cometh;*
> *but the earth abideth for ever.*
>
> *Ecclesiastes* I:III

This may well have been the utterance of the traditional Spanish American who has held to his ancestor's values and attitudes about nature and time. This traditional man trusted that his land would be there forever, for him and for subsequent generations to use, though he recognized his own finite nature. The land on which the early Spaniard settled is still there, but its profile has changed through the years of use and misuse. Additionally, contrary to his original notion, the land is not for the colonist's Spanish-American heir to enjoy, and much of what could be remains dysfunctional in the face of social and cultural change.

Accordingly, this paper will be an exploration and examination of the underlying human factors of change in land use and land displacement, giving especial consideration to the following points:

1. The Spanish colonist's social organization patterns and values and attitudes in relation to land.
2. The relation of these social patterns and cultural values to present land use practices.
3. The conflicts of traditional practices in a greater rational and legal dominant system.
4. Alternatives for the resolution of these conflicts.
5. Recommendations for a solution that would consider the worth and dignity of men.

## CUSTOM AND TRADITION

The Spanish population in what is known today as northern New Mexico acquired land from the Spanish crown by means of three types of land grants: (1) grants to influential military leaders, (2) grants to entrepreneurs and land investors, and (3) grants to colonists who were encouraged by free land to settle in the outlying areas. Existing traditional Spanish-American villages such as Trampas had their beginnings on land given to colonists, though perhaps other villages were carved out of one of the other type land grant.

Having acquired their land, Spanish colonists followed the logical pattern of development of human society. They formed relationships with each other from whence emerged social organization. Simultaneously, they formed spatial relationships in the formation of villages. These patterns, buttressed by Spanish Law, have left their imprint and must be recognized in order to understand the villages and the problems confronting them today. The ensuing discussion will, therefore, examine these early developments.

*Family* — The fundamental social unit in the early Spanish-American village was the extended lineal-collateral family, and it has, until recently, remained a functional system. The father was the one and only authority. In his absence, the eldest son assumed that responsibility. The mother assumed a submissive role and the children were equals under the absolute authority of the father. As the children married and established their households, they, in fact, did not start new "families", but became part of the husband's original family, thus creating clusters of smaller units that composed an extended unit. The extended family or families in turn formed the village. In essence, therefore, the extended family under the patriarch grandfather or "hermano mayor" (the eldest son) was the community, the community being the social unit in which people participated in decision-making and problem-solving. Other social units like the church had the same kind of hierarchical structure, with a leader or *patrón* at the head, and the rest of the people sharing an equal, subservient position.

Significantly, the familial way of relating to each other as social creatures affected the way the Spanish American settled on the land and subsequently divided it. Village spatial patterns followed logically from the social structure. Houses were built around the authority figures, the father for the family and the patron saint for the larger community. Hence, what today is known as *la plaza* is a village square built around the old village patrón and the church. The plaza, furthermore, followed that pattern because it was practical for houses to be close together for mutual protection against hostile Indians. As the extended families grew and fathers divided their land, however, the plaza slowly spread out to the fields or hillsides, starting *placitas* around the new head of household. And as more land for residences was needed, houses were built on the fields usually along the irrigation ditch or the road.

*Cultural Values* — As these Spanish colonists organized their social world, established their ways of getting along with each other and of living and working on the land, they also organized their philosophical world, their ways of relating to the abstract and intangibles of life, that is, nature, the supernatural, and time. Based on what they brought from Spain; what they experienced in their travels, in war, in adventure; what they learned from the Indians; and what they experienced as settlers and newly established farmers the colonists developed distinct values and attitudes toward these philosophical concepts. Anthropological research has revealed and categorized many of these underlying values and attitudes of the traditional Spanish-American culture.[1]

Cultural anthropologists hold that Spanish-Americans as a cultural group viewed their relationship to nature as one of subjugation. Man was not made in command of his own destiny. Nature and the supernatural controlled his fate in this world. Therefore, there was nothing man, individually or collectively, could do to alter its course. Thus, the notion of *fatalismo* developed: *lo que sera sera.* In pragmatic terms, this attitude toward nature was exemplified in the way man viewed his land, his stock, his flock. The rain storms were the work of nature and the supernatural; hence, there was nothing man could do within his finite power to influence their effect on his land. Consequently, the early stock farmer and his successor, even to this day, did very little in the way of protecting his land. It was overgrazed, but why not; land was to be used for what it had. And when there was no more—"it had to be that way."

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[1] Kluckhohn, Florence and Spiegel, John P., "Integration and Conflict in Family Behavior." The Committee on the Family and the Group for the Advancement of Psychiatry, August, 1954, New York, New York.

In addition to his orientation to nature, the colonist's attitude toward the land was greatly influenced by his orientation to time. To the colonist, the past was insignificant, the present was important and real, the future was vague—something that would duplicate the present. Man should, therefore, live and plan for the present only; the future would be like today. A corollary to this is the "mañana syndrome"—what one cannot accomplish today, one can do tomorrow. Consequently, the colonist had no plans for the future of his natural resources. He was satisfied with the present; the future was of no real consequence. The result, of course, was, in addition to the misuse of the land, the establishment of a system that operated intuitively and traditionally rather than rationally and legally.

This traditional system was crystalized and perpetuated by the isolation of the Spanish villages from the rest of the Spanish world and later from the rest of the larger American society. The values and customs, moreover, have been transmitted to present generations, and today we are faced with the results of the past.

## TRADITION AND THE PRESENT

The most salient traditions that have carried over from the early past to the present concerning land began with Spanish Law and with the early patterns of land transaction wherein accuracy of boundaries was unimportant and occupancy of land implied ownership. This, coupled with subsequent divisions of land among heirs initially based on Spanish Law, has yielded a complexity of problems for present land owners, in that much of the property under private ownership in the villages does not have merchantable titles and its boundaries are vague and inaccurate.

*Social System and Land Displacement* — Significantly, not only did informality in social relationships and Spanish Law affect the displacement of land among the Spanish-American, but in later years the formal social unit of the family with a patriarch at its head had great implications and socio-economic corollaries with regard to land. The notion of an absolute authority resting on the father implied that all the children were equal. Hence, in the distribution of land among heirs, Spanish Law notwithstanding, the father had to divide it equally among all his children. This violated the concept of primogeniture, the effects being of greater consequence than a mere philosophical difference; for the once substantially large land holdings were ultimately divided into strips of five or less acres per land owner (with some exceptions, however, as some people still own larger amounts of land), Although divided among many persons, the land still remained with the extended family, the basic social unit, making it feasible for that family to farm for subsistence, but highly impractical for the prospective modern farmer to derive a livelihood from it.

Unfortunately, the extended family as the basic unit in the Spanish-American society has been faced with drastic changes since the 1930's and especially following World War II. With the improvement of communication and transportation media, villages became exposed to the values of the dominant society. While many families remained cohesive and functional as an extended group, others disintegrated in the face of transition from a traditional folk society to a rational industrial society. The result was that as the basic social unit (the extended family), was displaced there was nothing established to replace it. This accounts for some of the social disorganization prevalent in some Spanish-American villages today that, in turn, affects land use and land displacement, for the land of these particularly disorganized families is dysfunctional, out of productive use. A corollary of family breakdown, therefore, is breakdown of land use. Furthermore, the land is infinitely tied up because of the lack of any clear picture as to legal ownership. Usually one member of the disorganized "clan" is informally responsible for taxes and water rights, but if a legal transaction is to be made, many more people would have to be contacted, and often they may be away in another state or unwilling to settle their business legally.

In addition to the connection between land displacement and the social structure, it must be recognized that property ownership to the traditional Spanish-American is not a legal, economic factor. Land is not a commodity that is sold by the owner when he wishes to enter the real estate market for economic gain. Land is directly related to his own being, his life. Hence, Land is home, and yet more than home to some; it is part of body and soul.

## SYSTEMS IN CONFLICT

Spanish-American villages, although undergoing a tremendous transformation, hold to a traditional social system that is in conflict with the American rational and legal system. This clash is not one of individual against individual. The question of the two being in conflict is absolutely amoral; they just conflict, and this is neither good nor bad. The ensuing discussion, therefore, will hopefully be objective and analytical, for the end is to point out when and why the two systems came to oppose each other and how this pertains to land use and land displacement.

*History of Conflict* — The traditional Spanish-American social system unquestionably came in contact with the American system during the Mexican-American war which was officially terminated by the Treaty of Guadalupe Hidalgo in 1848. The treaty brought to an end the military phase of a war—by far the first step in the conquest of a geographical area and its inhabitants. The economic phase of this conquest followed immediately. (By economic conquest, I do not mean that the United States had taken the land and redistributed it among Americans, but that the rational system of the United States went into play and imposed upon the Spanish Americans its legal models.) Though ignored at first because of its lack of economic appeal, the Spanish-American north is now viewed as a good commodity based on its recreation potential and so the bargaining is on, and Spanish Americans are feeling the pressure more than ever. Now the traditional, isolated villages are in the arena of economics and trade. This represents the climax of a hundred year old conflict that might well spell the end of the Spanish-American culture.

Accordingly, the traditional Spanish-American system which held that land was not a commodity, which displaced land through informal structures, and whose social breakdown had corollary dysfunctional effects on land, is squarely confronted with a system in which the converse is true. The outcome of this struggle is predictable: the stronger rational-legal system will prevail over the weaker, more vulnerable traditional and informal system.

*Points of Conflict* — The greatest and most salient point of conflict between the two systems and the most vulnerable for the weaker one is that of surplus private and public land. I am referring to land that is not in productive use, but is privately owned or is administered by a governmental agency.

The conflicts and vulnerabilities concerning private land have been referred to indirectly in this paper in regard to family disorganization and land displacement. More specifically, however, when the members of a disorganized extended family are geographically separated yet all have claims on the various plots of land, it is difficult to turn that land into productive use. The owners do not want to farm it as the yield is insufficient for an adequate livelihood, yet no one else can legally have access to it either by lease or sale because the titles are vague and claims to it are numerous. Although one member of this complex is responsible for the water rights and taxes, he will inevitably fail on one or the other and the property becomes prey to the State or an alert land speculator.

The weakest point of conflict for the Spanish American now, however, is not the actual loss of private land through tax default, but through loss of water rights; for since the land is not in use, adjudication of water will certainly deprive this barren soil of its life-source forever. Then, even if these people have been holding on to their land because it has meaning and it is something to return to, they will have nothing. This fear is close to being a reality now more than ever because of the big drive to turn northern New Mexico into a recreation mecca for urban dwellers. Water adjudication precedes industrial development. And the outcome is foreseeable for the villagers as they still view these problems from the traditional point of view: the dominant system will prevail.

Relevant to this discussion are the factors introduced by the policies of the Welfare Department. Traditionally when a person or a sub-unit-nuclear family experienced a crisis, it received help from the extended family or the church without having to relinquish its land. And often the dysfunctional family or its children could again bring its land resources into productivity. Now the State assumes the helping role, and it requires that the family in crisis dispose of surplus property or get it into productivity if assistance is to be rendered. It is very difficult for many Spanish-American welfare recipients to face and handle this particular problem; yet it seems that neither the traditionalists nor the modernists understand each other's position on this issue, as the heart of it lies in a deep-seated value on both sides rather than in intellectual fact. Spanish Americans view the practice as a heartless thing, because land is a meaningful possession; the state official holds that land not in productive use by industrial farming standards is of no value.

The conflict exemplified in surplus public land concerns chiefly grazing rights and privileges. Traditionally, even though the public land surrounding the villages was not legally the possession of the individual inhabitant, he continued to use it for grazing sheep and cattle for his own subsistence. The social structure did not require formal grazing permits. He merely used the land, for according to his value, land was there today for his use and would be there tomorrow. The dominant system imposed rules and regulations. The stockmen who ran cattle and sheep commercially adapted, at least outwardly, to the rules and acquired permits. The subsistence farmer, who probably had less than five cows often continued to use the land while it was there. With more rapid penetration of external values and the influx of people who held to the rational-legal concepts, even the land informally used by the subsistence farmer became vulnerable. And today we have the example of a community that suddenly discovered its so-called public domain for grazing was leased and fenced by a commercial rancher from another part of the state.

There is an overall threat to the Spanish-American villages and their inhabitants, both Spanish and Anglo, through public and private, that touch on both public and private non-surplus, productive land: the industrialization of the region with recreation facilities. Many of the villagers view this trend with disinterest: whatever will be will be. But others see it as perhaps the strongest drive by the dominant system in the course of resolving the conflicts between the two. Indices that point to this drive are found in the overall plans for the water of the state. More water is being diverted to the industrial parts of the state. The streams in the north will be used for recreation industry. Moreover, private landowners are being urged to transform their agricultural land to recreation. These are ideas espoused by the rational system, yet they are in obvious opposition to the notions of land use and land displacement held by the villagers.

Again I wish to emphasize that the foregoing analysis is not a passing of judgment on either system, but merely a pointing out of problems. However, the following discussion will deal with the ethical implications, as it will outline the alternatives for resolving such conflicts as they relate directly to human worth and dignity.

## RESOLUTION OF CONFLICT

Inasmuch as the American rational and legal system is stronger, it will prevail over the weaker Spanish-American traditional system. And we may rest assured that the trend will not be reversed, nor is it desirable that it do so. Another pertinent issue remains, however, and that concerns the various courses of action that the dominant system may take in ultimately fulfilling its inevitable task.

At this point the deeper values of the democratic society will have to be brought under scrutiny, for the deliberation of alternatives must be based on ethical considerations as the struggle does affect people. Democracy holds that the individual person is most important in our society, that man has worth and dignity. Accordingly, in this case, the worth and dignity of the member of the weaker system must be preserved in the process of transition from his own tradition to a more sophisticated and aggressive one, as he is the one in danger of exploitation. And, of necessity, it is the responsibility of the stronger system to see that this is achieved. Value judgments and decisions must, therefore, be made.

The process in the natural resolution thus far has included several alternatives, some of which have been traumatic to the Spanish-American by virtue of their exploitive nature. Examples of this approach are varied and many, especially in regard to land displacement. Currently, the exploitation is more subtle in that it is part of an over-all economic plan for the region that promises vast developments by allocating land and water for recreational purposes and other industry. If this pattern is allowed to proceed unchecked, the outcome will be that only a few entrepreneurs from the region and some outside investors will benefit. The local village dwellers will become the quaint relics of an old culture to be viewed by tourists as they spend their money in the assigned industrial site. In terms of social cost, this approach will be more expensive to the dominant system as it will have to provide rehabilitative social agencies such as the welfare department to, in effect, pick up the pieces of human waste.

Exploitation eventually leads to elimination. Former inhabitants of the region who have adhered to the traditional system have left the area to seek a better life elsewhere. Few, if any, of these people were actually pushed off their land, but the majority left because as individuals in this social and cultural conflict they were but pawns for the whims of destiny. They found themselves between the two systems but members of neither, for having been introduced to the values of the dominant one, they held to the tools of the traditional one. They wanted better jobs, but lacked the skills to acquire them; they wished to farm, but diminished landholdings and insufficient implements and capitol placed them out of the industrial market. Thus they had to leave the area, and today, while many have integrated into the larger society in the urban center, others still work at menial tasks, always hoping that things will get better back home.

The American rational system has not been all that cruel, as more desirable alternatives have been taken which have been beneficial to all concerned. In some areas, the traditional system has had to concede some of the values while the dominant system has also conceded and a compromise has been reached. The outcome of which is coalescence. Coalescence, at the present rate of economic growth in the North, is but one alternative and one not deliberately chosen by either side. If it is to have significant impact today, it must be deliberate and expeditious.

Coalescence could be an end in itself, but usually within a generation or two, it will have become but a step toward assimilation. It is, nevertheless, an important and necessary step if assimilation is to be achieved with ease, and if American society is to allow for differences in groups as well as in individuals. There are attempts by some who, having been caught in the maze of traditional conflicts, jump to assimilation only to find themselves, like the person that is being eliminated by the system, in a state of limbo.

The writer, therefore, feels that if the transition is to be achieved with dignity for the traditional man, coalescence is the desirable end. Realistically, however, this cannot be done without active interference by the dominant American system, which by now includes Spanish-American individuals as well as Anglos. Accordingly, the following section will be a design for accomplishing this end.

## A DESIGN FOR CHANGE: A SOCIO-LEGAL PLAN

A plan for change must be based on the points of conflict between the Spanish-American tradition and the dominant American value system, and anticipated by a study of the weaker system's social organization, values, and attitudes. It would ascertain, for example, the impressionistic notions mentioned in this paper that the extended family, in fact, left a vacuum as no social unit succeeded its displacement, and the subsequent social disorganization affected the use of land. Thereupon, it would proceed to aid the replacement of the disintegrated extended family by creating collateral relationships in the form of community. This would afford the individual an opportunity to relate to other humans in a healthy manner and would eventually provide a vehicle for decision-making and problem-solving on a village scale. One of the anticipated results of community organization would be the placing of surplus land in productive use.

Such a plan would, of course, presuppose a commitment to the human values of a democratic society and academic and practical understanding of individual human behavior in social and cultural change. In addition, it would demand knowledge of community behavior which would become necessary in the reconstruction of interpersonal relationships for problem solving.

A design of this nature would also require a new dimension as a part of a social service plan for northern New Mexico, and that would be a legal service to educate the people in transition in their rights and privileges in a rational-legal system. Legal services on a private basis are available now, but often they, too, are a point of conflict in themselves because of the socioeconomic standards of the people who need them most; thus they are not used, and if used, are not clearly perceived as a service whose end is the protection and perpetuation of justice and freedom.

The translation of this plan into action would mean a work project under the administration of a private or public agency committed to social services. The personnel required would be from (1) the field of social science, namely anthropology and/or sociology to conduct research on social organization, values, and attitudes; (2) attorneys for legal education and direct services; and (3) practitioners of behavioral and social science to do the actual community organization.

The first area of concern for this team would be social community organization (the reestablishment of collateral relationships), which would then lead to the establishment of priorities. It is predictable that one of the first priorities would be land use and land displacement, especially with regard to use of land for economic gain. At this point the community would encounter conflicts because their concept of economic gain could conceivably be opposed to that of the dominant society. The worker in the community would at this time introduce the legal services while he offered the psychological support necessary to work out a compromise. It is foreseeable that if the community organization began to replace the supposedly displaced extended family, that with legal help, land use organizations could be formed to get the surplus land into productive use. This would absolve the fear of water adjudication and would also produce a profitable yield for some enterprising group in the village who wanted to use the land. Moreover, once having legally cleared the land titles, the community members could also sell the land for consolidation into larger tracts. Whatever the choice, it would be the peoples' choice, and not one imposed by someone, or hastily and unsoundly decided upon because of lack of legal information.

This approach would indeed be conducive to the establishment of a climate that would lead to coalescence. In the long run, both the Spanish-American villages and the greater society could reap the benefit. No doubt one can anticipate many problems that are beyond the scope of this paper, yet the note of urgency remains that there is not too much time left before one can truly add new meaning to another scriptural passage: "the meek will inherit the earth." The earth what? The earth road!

Acknowledgement is given to Mr. Edward D. Devereux for his help in developing the section on Systems in Conflict.

# The Bio-Economic Community: Reflections on a Development Philosophy for a Semiarid Environment

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*Santa Fe, New Mexico*

## PHYSICAL ENVIRONMENT

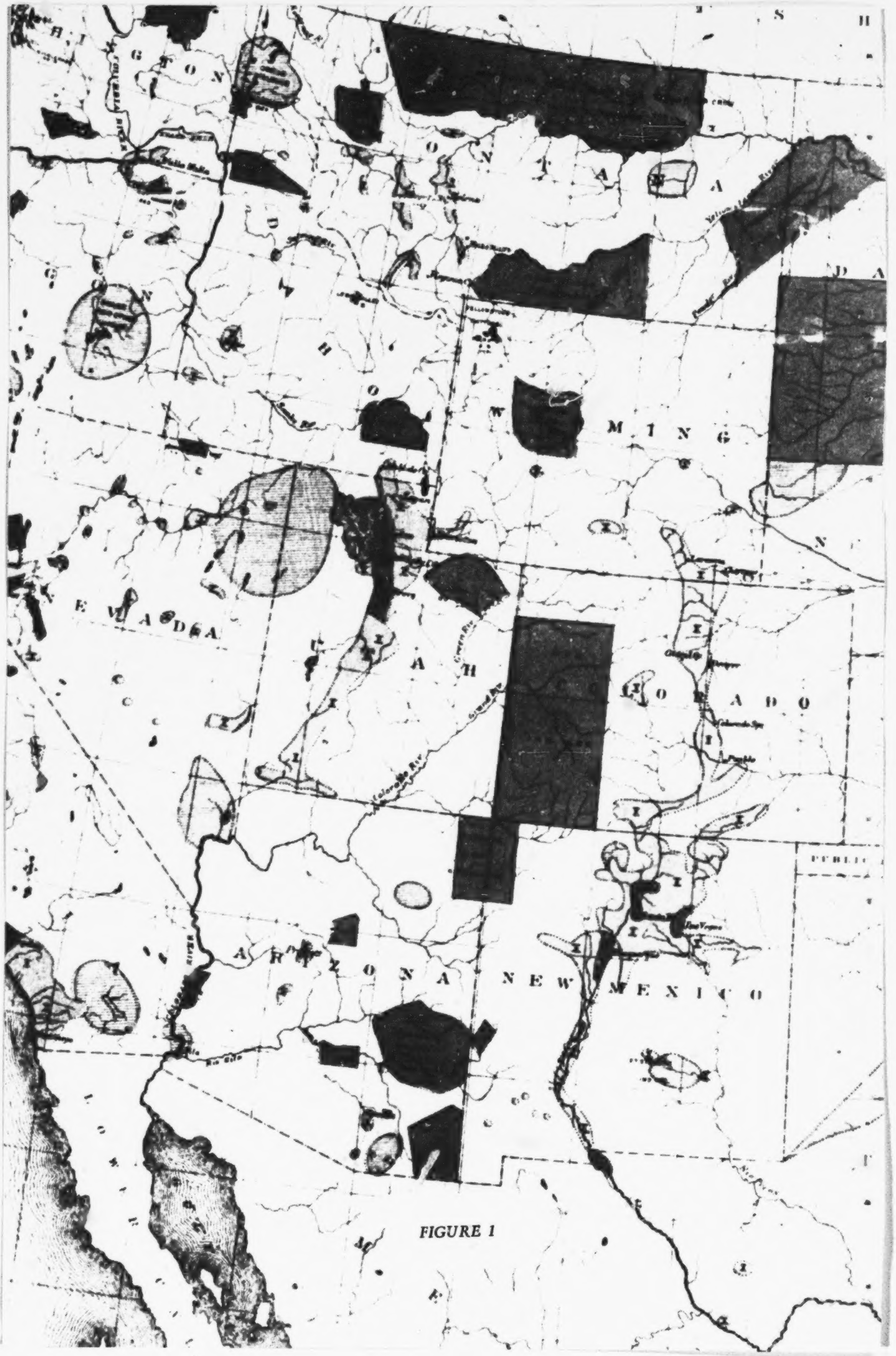
The "semiarid environment" I shall discuss in this paper, which I term the *northern New Mexico uplands,* is formed, physiographically, by the southward extension across the 37th parallel of the upraised land mass of the southernmost Rocky Mountains. The resulting island or peninsula of wooded or forested highlands covers about 13,000 square miles and ranges from slightly below 6,000 to almost 13,000 feet in elevation above sea level. It is thus a relatively verdant and well-watered oasis in the general semi-desert of the Southwest, although all except a few score square miles at the very highest elevations receive less than 30 inches of precipitation annually and are still semiarid climatically.

In topographic terms, this region is one of high relief; it is broken horizontally by upheaved mountain masses and the characteristic mesa forms resulting from the erosion of ancient sea bottoms; it is dissected vertically by the canyons and steep valleys of the numerous streams which traverse it. It is split along its north-south axis by the connected gorges and valleys of the Rio Grande into two major eastern and western ranges—the Sangre de Cristo and the San Juan.

Three of Bailey's life zones—the Upper Sonoran, the Transition, and the Canadian—make up the great bulk of the land surface here. The lowest of these is the characteristic "pinon and juniper" foothills country marked by sparsely covered and often erodable slopes usually bearing such plants as the sagebrush and chamisa. The zone from roughly 7,000 to 8,500 feet is typically that of the great Ponderosa pine stands, which Bailey spoke of as "natural parks." Still higher are the spruce and aspen forests which are almost Alpine in character.

What we might describe as the "hydrologically strategic" position of this region—the fact that it receives relatively high rainfall and snowpack in a generally semi-desert land—has always influenced the forms of human culture within and around it, and is especially significant today. A substantial proportion of the stable flows of three major basins—the Rio Grande, the Pecos, and the Canadian—originate here, and much of the economic life of New Mexico and adjacent portions of Oklahoma, Texas, and even Mexico is dependent on these flows.

The patterns of settlement here seem always to have been strongly influenced by the requirements of irrigation agriculture, which necessitated



NEVADA
UTAH
WYOMING
COLORADO
ARIZONA
NEW MEXICO
PUBLIC

FIGURE 1

a balancing of factors such as the availability of level patches of fertile land in relation to convenience of stream diversion points, reliability of flow, and seasonal temperature ranges at sites with varying elevations. Since ancient times, Pueblo and pre-Pueblo communities have occupied fluctuating locations along streambeds in the Upper Sonoran belt where seasonal runoff from the mountains could be captured by simple brush and stone barriers before it was seriously diminished by evaporation or percolation, where the higher woodlands, could be reached for hunting or food gathering without too long a trek, and yet where the milder winters characteristic of the semidesert minimized the rigors of existence.

## THE HISPANIC ENCLAVE

The Spanish colonizations from Chihuahua (a thousand miles south by ox-cart and pack-mule trail) followed a similar pattern in the 18th and early 19th centuries. Armed with more powerful tools and techniques, however, they were pushed to higher elevations where streams flowed most steadily and free of sediment, where the rich forest stands provided a ready supply of construction timber and firewood, and where mountain meadows could be cleared with steel tools or fire for grazing by sheep and cattle. From this resulted the distinctive constellation of compact high valley-based villages which dot the region, and which for a long period represented the only relatively well-developed major zone of European settlement in the vast interior Southwest. Figure 1, reproduced from the U.S. Census of 1870, shows this isolated island of relatively high population density towards the close of this period. Only the comparatively new Mormon settlement around Salt Lake shows a comparable pattern at the time of this census.

Even today, the northern Hispanic uplands are still substantially the most densely populated of any of the major divisions of New Mexico, the place-names here are three times more frequent than the State average, and the cultural imprint of this early settlement phase is unmistakeable. In contrast to the typical midwestern and plains pattern of isolated rural farms, each of the many settlements here is an urban microcosm, showing—even when neglected—some style, shape, and architectural character: often an embryo plaza; usually a distinctive church (Figure 2); always an interesting pattern of adobe farmsteads with their accompanying corrals and sheds disposed along the irrigation *acequias* or the narrow mountain roads. One of the few highly distinctive regional styles in the United States evolved from this locale, and still inspires the architect and artist. See Figure 3.

## THE ECONOMY OF THE REGION

Figure 4 depicts the region (which I have outlined) as it is today. Note the multiplicity of place names compared with the remainder of the State area shown. Note also the preponderant dotted tracts lying along the eastern and western lobes of the region. These are national forest lands which, together with other Federally and State controlled lands, make up about 65% of the surface of the region. The small cross-hatched tracts are Indian reservations, all of the Pueblo type—considerably smaller than the large reservations typical of the plains Indian groups in the lower and more arid parts of the State. I have also sketched the outline of three embryo "urbanizing" or "submetropolitan" zones within the region. The largest of these is the Santa Fe-Espanola-Los Alamos triad in the lower center. This is the locale of the most active modernization connected with Federal scientific installations,

(Photograph courtesy of New Mexico Department of Development)

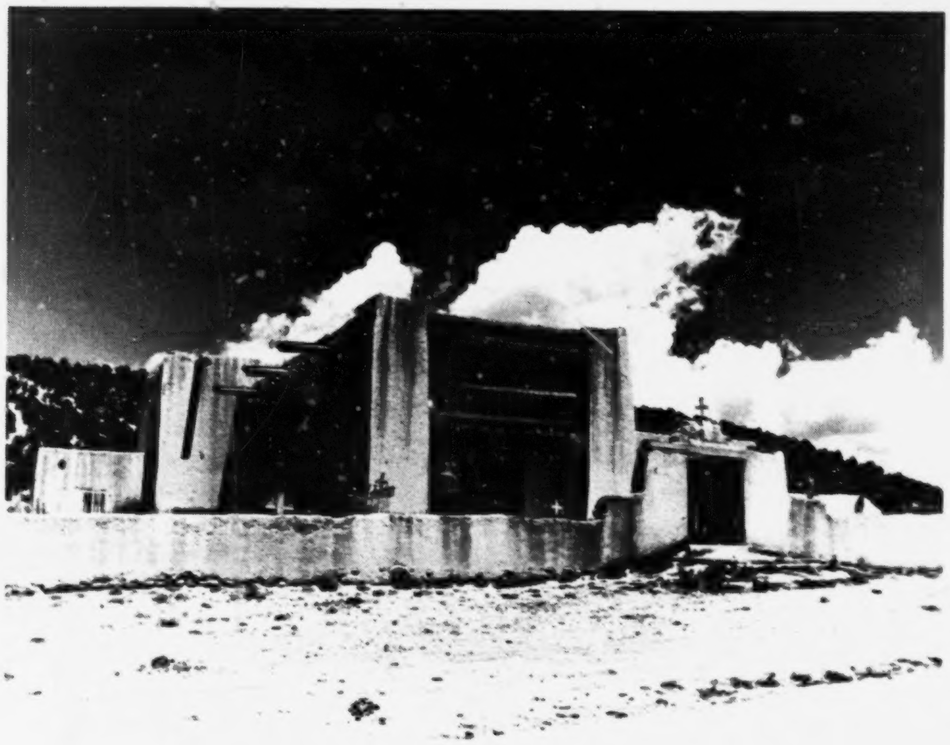


*FIGURE 2*

(Photograph courtesy of New Mexico State Tourist Bureau)

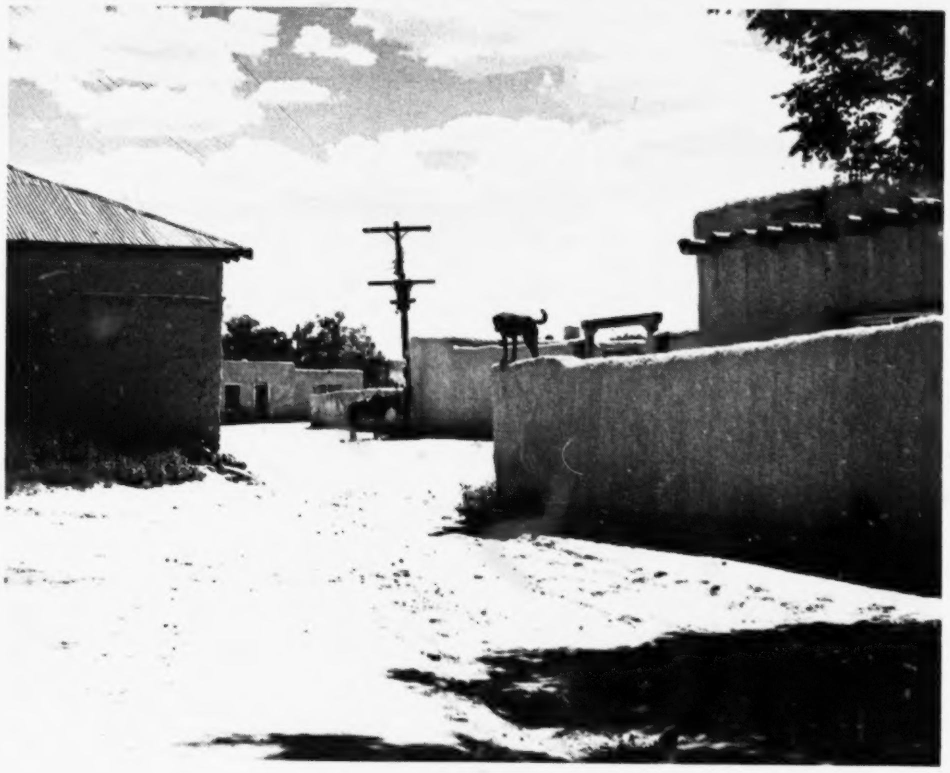


*FIGURE 3*

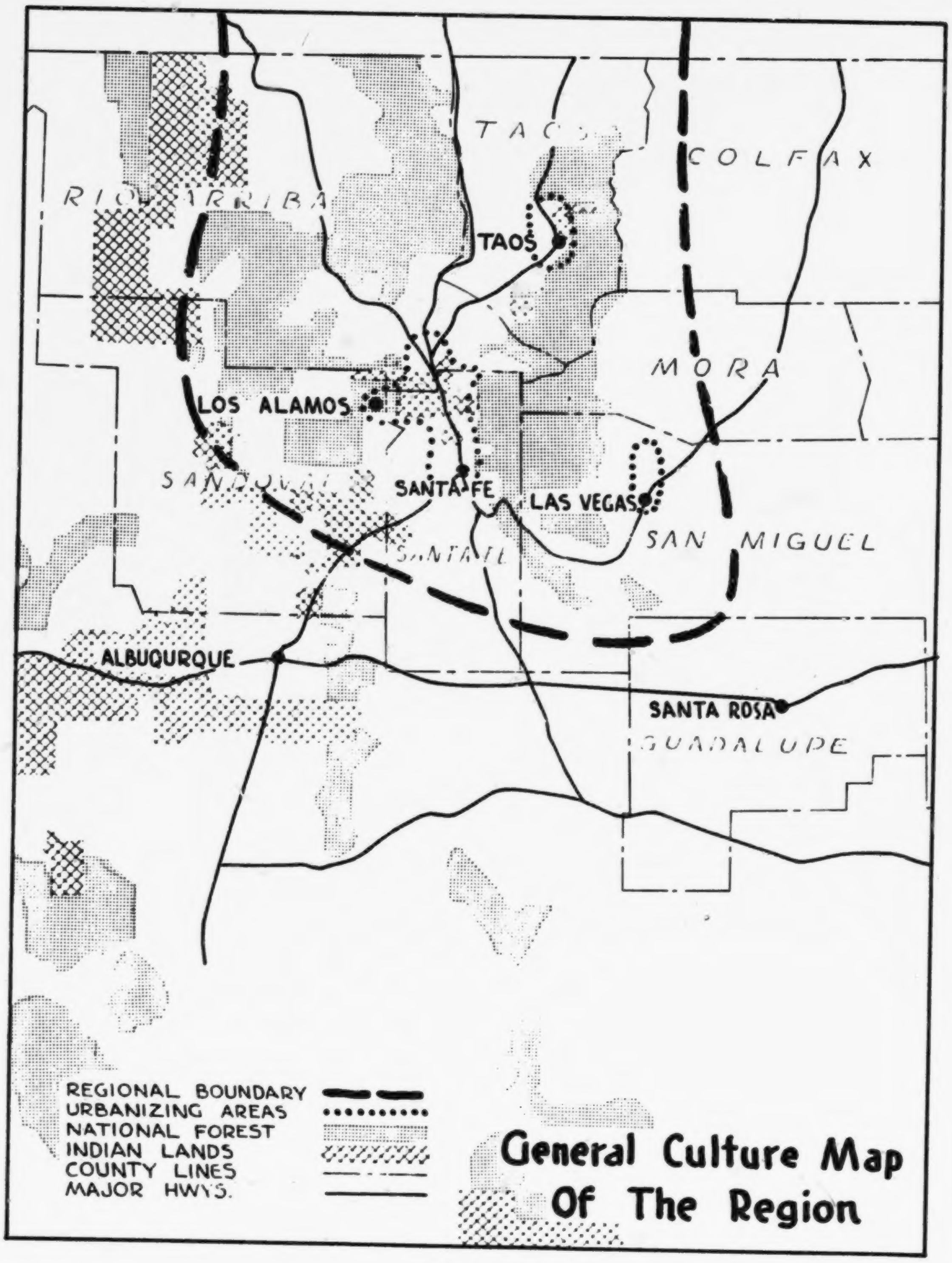
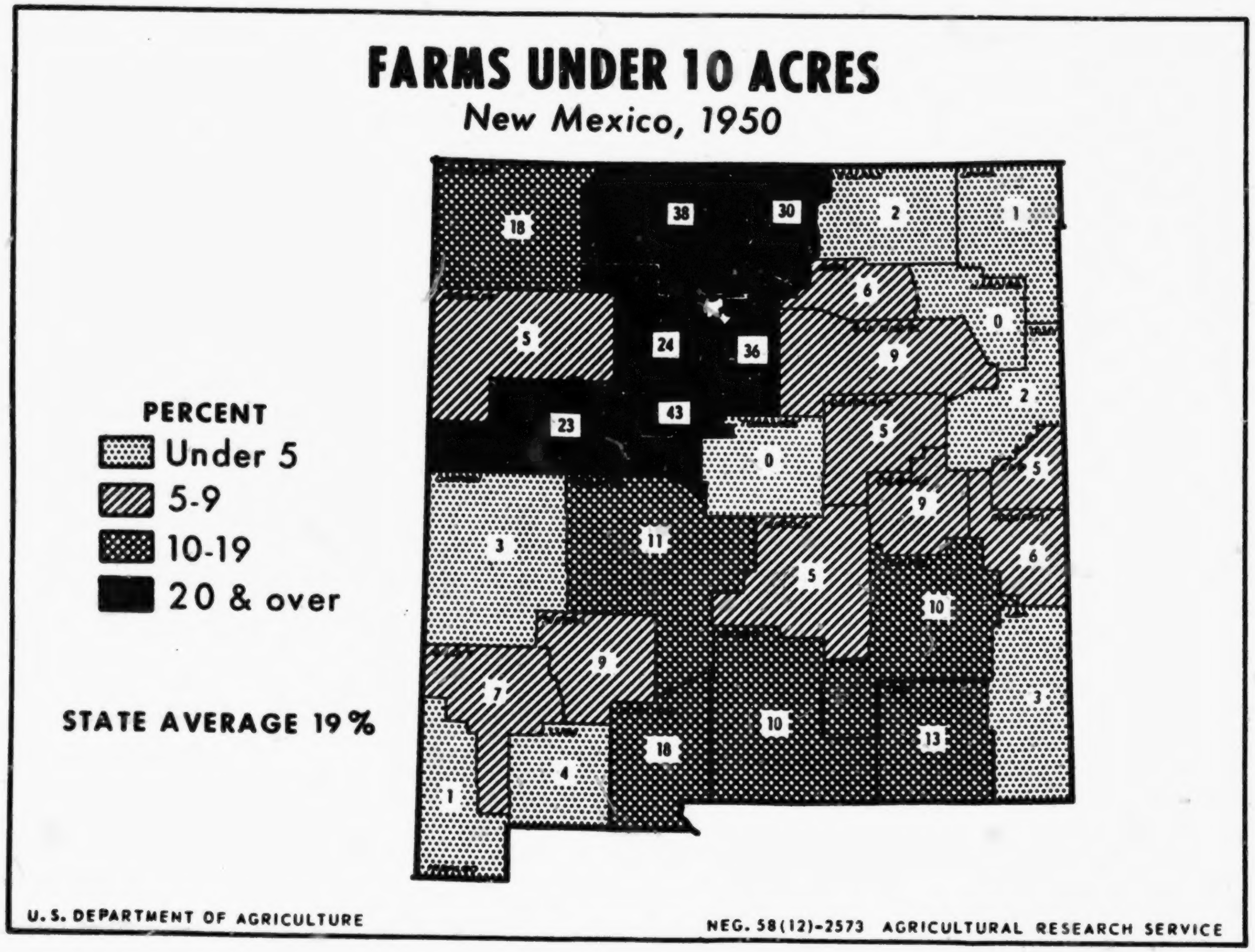

TAOS
COLFAX
RIO ARRIBA
TAOS
MORA
LOS ALAMOS
SANDOVAL
SANTA FE
LAS VEGAS
SANTA FE
SAN MIGUEL
ALBUQUERQUE
SANTA ROSA
GUADALUPE
REGIONAL BOUNDARY
URBANIZING AREAS
NATIONAL FOREST
INDIAN LANDS
COUNTY LINES
MAJOR HWYS.
General Culture Map Of The Region

FIGURE 4



FARMS UNDER 10 ACRES
New Mexico, 1950

PERCENT
Under 5
5-9
10-19
20 & over
STATE AVERAGE 19%
18
38
30
2
1
6
0
5
24
36
9
2
23
43
0
5
5
9
3
11
5
6
10
9
7
10
3
18
4
13
1

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FIGURE 5

State government expansion, tourism, and commercial agriculture. Smaller zones of urbanization, mostly associated with tourism, occur around the old pueblo metropolis and Spanish trading town of Taos in the northeast, and around Las Vegas, built up during the first heyday of rail communications with the east, when the town was a main terminus and cattle market.

The principal vital and economic indices of this region, as of 1960, stood somewhat as follows:

*Population*: 133,000 (14% of the State total) or about 10 per square mile. Fifty-one percent of this population was classed as urban (State average, 65%). The balance, although called "rural" by the Census Bureau, lived as before suggested, mostly in small hamlets and villages, not on isolated farms as the term implies in much of the United States. These settlements were above the national average in proportion of children, and below it in the proportion of younger adults. As a whole, the population has remained constant since 1940, although certain of the more remote sectors, as villages on the lower eastern and southeastern piedmonts of the Sangre de Cristos, have suffered severe losses which have only been compensated within the region by growth of certain towns subject to the newer urbanizing forces, especially Santa Fe and the Espanola valley. Even so, the population density of the region in 1960 was 40% higher than that of the State as a whole, despite the rapid growth of a few new-era cities outside the region.

*"Basic" or "Primary" Economic Activity* of the region may be estimated for 1960 at about $70 or $80 million. The largest single component of this income-generating activity was about $30 million of funds funnelled into the region from outside (although these dollars, of course, do not represent "production" in the pure sense). Probably over half of this flow was in payment for the exported labor of private residents working as far away as California, Montana, or Michigan. Somewhat less than half represents government net payments, either in the form of welfare subsidies or wages for government employment.

The next largest primary productive activity was the growing of *livestock and crops* which yielded a census-record value of about $17 million. This figure reflected a rather low average dollar value per agricultural acre —$25-$35 for irrigated croplands, $2 for grazed lands. The relative size of the total expresses the still dominant agricultural preoccupation of the people, while the low unit value indicates the strongly subsistence orientation of that preoccupation. Figure 5, prepared by the U.S. Agricultural Research Service, depicts graphically this subsistence pattern of farming in the north-central counties, as indicated by average size of farms in 1950.

Primary funds released by ***travelers and tourists*** in search of recreation are difficult to estimate, but the best data I have been able to gather suggests a total annual value of about $16 million for 1960.

*Forest-product yield*, which a superficial look at the geography of the region would suggest as one of the major sources of revenue, probably averaged about $7 million total value annually for 1960 and a number of preceding years. Figure 6 depicts the areas of commercial timber stands of the north-central counties, in the mid-1950's, as calculated by the State Department of Economic Development. The somewhat less than 5,000 square miles of such timberlands shown here averaged a yield of about $1,400 per square mile, and probably not over 1,200 to 1,500 of the total labor force of

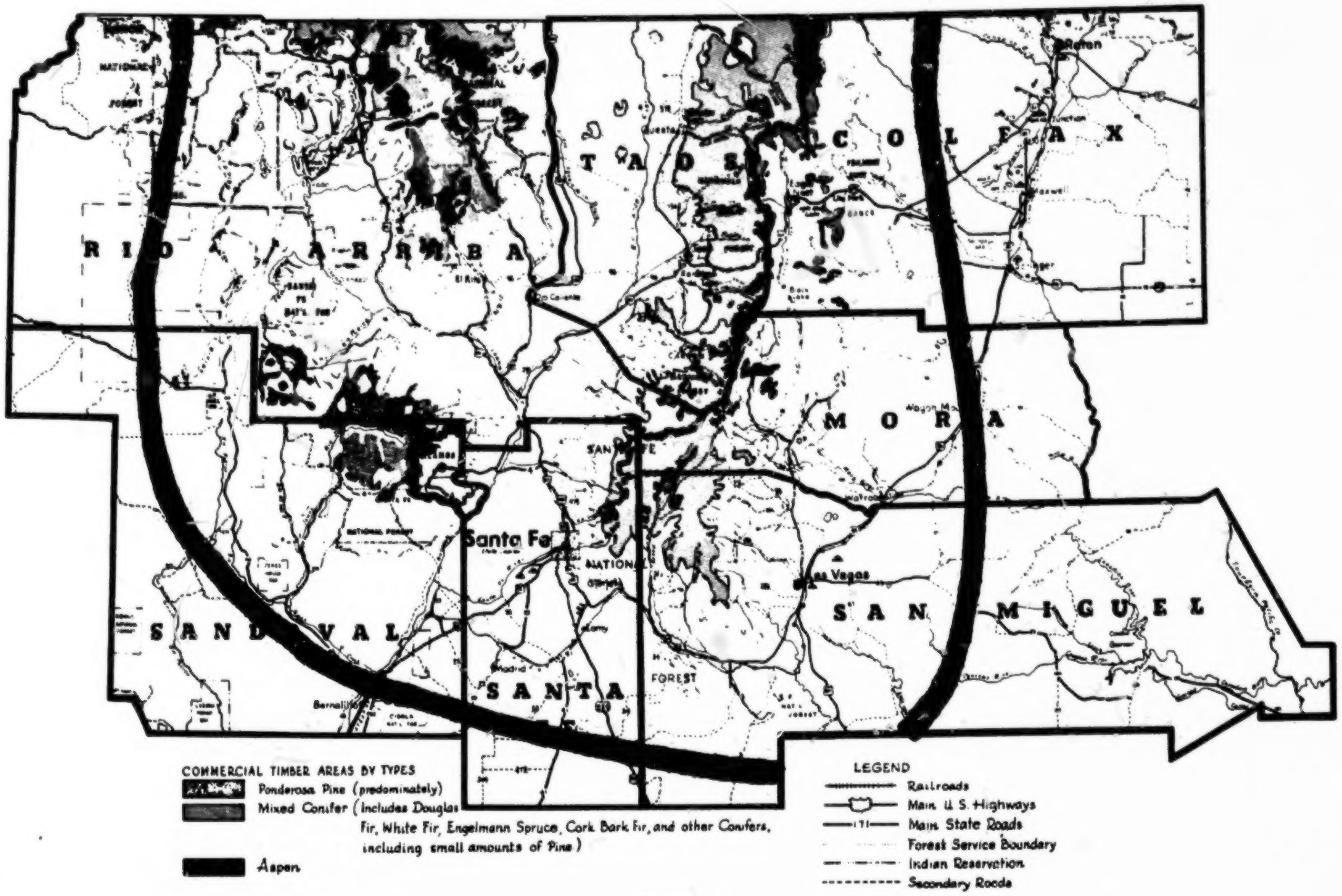

R I O A R R I B A
T A O S
C O L F A X
M O R A
S A N D O V A L
S A N T A
S A N M I G U E L
Santa Fe
Las Vegas
Raton
NATIONAL
FOREST
COMMERCIAL TIMBER AREAS BY TYPES
Ponderosa Pine (predominately)
Mixed Conifer (Includes Douglas Fir, White Fir, Engelmann Spruce, Cork Bark fir, and other Conifers, including small amounts of Pine)
Aspen
LEGEND
Railroads
Main U. S. Highways
Main State Roads
Forest Service Boundary
Indian Reservation
Secondary Roads

FIGURE 6

30,000 were employed in forest care, timber harvesting, and wood-products manufacturing.

*Other miscellaneous manufacturing* produced a greater value-added than the forest-based activities: probably around $8 million. The percentage of people so employed was, surprisingly enough, not very different from the State average. The bulk of such activity was concentrated in Santa Fe.

*Mining*, although for long a colorful component of the regional landscape, produced a total value of something like $2 million if one aggregates the output of the several small coal, mica, beryl, etc., workings scattered throughout the mountains.

The total of these "primary" revenues, complemented by a slightly smaller total of "secondary" activities in trade, services, utilities, construction, finance, etc., stood at about $130 million, which represented a per capita income of somewhat under $1,000. This compared with a State average of about $1,900.

Evaluated in terms of productivity reduced to a land area basis, the total yield of the region in values derived from land resources may be estimated for this period at about $4.70 per acre, or about $3,000 per square mile.

In common with the statistics for most highland and hinterland regions of the United States (the largest and most publicized being at present probably Appalachia), these figures suggest the presence of the classic syndrome of rural economic depression and population stagnation in the northern New Mexico uplands, outside of the small nodes of urbanization. Bypassed by the march of progress, isolated from mass markets, situated amidst rugged terrains unsuitable for large-scale agriculture or large-scale timber cropping, the traditionally self-contained regional economy has tended to falter. Fields and *acequias* in numerous valleys have been neglected and dwellings abandoned. Young people have emigrated to the cities in search of employment and wider horizons.

The infiltration of certain benefits from the general progress of society and the nation-wide technological advance—such as paved roads, rural electrification, and modern school buildings; the welfare and custodial programs of various Federal and State agencies; the penetration of some tourist trade—have not sufficed to counteract these competitive disadvantages in the modern world, and the region continues to lose relatively in economic and population status, and perhaps even absolutely in the latter. Extrapolated a few more decades, this trend has been interpreted by many to imply an ultimate complete decay and disappearance of the traditional culture and economy.

Despite this generally negative prognosis and current fascination exerted by booming metropolitan centers and "EDTR" (Experiment, Development, Testing, and Research) complexes, the destiny of this regional community continues to be of considerable general concern. To a large extent this is a reflection of the unique cultural heritage embodied here, and of the stubborn vitality of this tradition under adverse circumstances.

But this factor is reinforced by the physiographically determined role of the region as an important water catchment area in a chronically thirsty territory. With each passing decade the strategic importance of this function becomes more sharply emphasized. The large irrigation districts and dams established during the first half of the 20th century along the lower reaches of the three major rivers, the more recent missile-age defense establishments planted about the State, the booming metropolitan resort-retirement housing developments, constitute powerful and water-hungry new elements in the body politic whose needs must be responded to.

Simultaneously, the mounting national demand for outdoor recreational *lebensraum* in an era of restless, rubber-tired tourism focuses a parallel attention on the naturally verdant wildlands and forests, and the scenic vistas, of the higher portions of this mountain enclave. The question of the future optimum management, control, and exploitation of such lands, and of the life-giving waters which they command, thus becomes increasingly insistent, and has for some time been spurring various reactions in the fields of government administration, planning, and entrepreneurial activity, not to speak of politics, too involved to trace here.

I would like, however, to discuss in general terms two contrasting attitudes or approaches to this pressing question of resources utilization and economic advancement which we encounter today, with reference to this upland region (and, in fact, to many similar regions about the nation and world).

*The first,* and by far the best articulated of these alternative approaches, consists essentially of the continued application of contemporary practice in the fields of industrial analysis, investment management, and economic planning—especially as this practice has crystallized since World War II. The prescriptions of this policy—which one encounters at many levels and in many functional divisions of government, in academic circles, and in the councils of business and finance—are by now virtually codified into a body of economic development procedure for "emerging" societies. This procedure calls for the formation of an "infrastructure" of basic public facilities—usually multimillion dollar dams and canals, power networks, and heavy-duty highways. In recreational areas which are, or can be made, accessible to a mass public, this infrastructure may also include governmentally improved scenic parks and preserves in particularly favored sites. This sector of public deficit-financed construction is, in turn, intended to facilitate the channeling of large-scale private (usually corporate) investment into such income-generating, export-oriented projects as bulk wood processing plants, deluxe resort complexes, irrigated monocultural plantations, or consolidated ranching operations.

Examples of most of these prescriptions for economic advancement are to be found in various stages of production or completion by a variety of agencies and interests throughout or adjacent to the northern New Mexico uplands.

Applied in a thoroughgoing fashion, *this policy might be described as one of orderly evacuation of the region,* followed, or accompanied by, a planned reconstruction of its economy in terms of the large-scale rationalized and mechanized installations capable of competitive survival in the age of automation. Complementing this technological reconstruction, there is visualized the extension and intensification of custodial management by appropriate agencies, of wildland preserves—for recreation, for water yield, for limited forest production, for carefully restricted livestock grazing, and for wilderness values. A drastic reduction in permanent population is accepted as an inevitable—in fact, a desirable—byproduct of this economic overhauling, since the remaining population may the more readily be retrained to the technical skills appropriate to the limited, but higher paying, employment requirements of the new-era operations.

Despite the impression of rigorous logical necessity conveyed by this doctrine of economic development and despite its wide acceptance and often authoritative presentation, I think it necessary that we keep in mind certain of its inherent limitations and drawbacks, particularly in relation to physio-cultural regions of the kind we are considering here.

The most serious of these drawbacks arises from the fact that a very large proportion—probably the bulk—of the economic benefits and the potentials for resources improvement associated with such a region are of the kind which can only be realized by a labor-, skill-, and people-intensive pattern of land use and productive organization, rather than by the machine-, capital-, and system-intensive operations of contemporary development theory.

Amongst the benefits and potentials so realizable must be included practically the entire range of improvements in biotic yields (forests, stock, game), soil condition, recreational opportunity, and even hydrologic management. All these useful fields of endeavor, while strikingly responsive to the application of scientific knowledge, are in the final analysis dependent on the continuous deployment of intelligent and dedicated human effort over extensive land areas, in essentially personal and manual tasks. This is especially true in a region of rugged terrain, pocketed and mixed timber stands and vegetative types, easily erodable soils, and marginal precipitation. Later I shall attempt to suggest the very impressive magnitude of the aggregated value of such "grass roots technology" if applied consistently to an entire region such as the uplands.

By its inherent nature, big technology operating through the big project (whether public or private) can realize only a fraction of these potentials. It must concentrate on those forms of resources-utilization or management which can be handled by machinery or equipment with the minimum of human involvement—the giant dam in the one strategic location, the deluxe lodge or marina at the choice scenic site, the superhighway through the most accessible valley-system, and the automated pulp or timber mill commanding the finest timber stands. Only by such tactics can it justify the investment it represents or compete with similar installations elsewhere. Frequently, despite such selective tactics, and with the most careful planning and engineering, it cannot so compete, and must be subsidized with the inevitable entrainment of bureaucratic and political complications.

In the course of this process of "development" this rationale usually accentuates and aggravates some of the most destructive tendencies of modern times. It recreates, in provincial, rural, and primitive settings, the very patterns of centralized congestion surrounded by sub-economic blight which is demoralizing our metropolitan areas. It reduces the cultural landscape to a sterile and institutional bleakness, punctuated by painfully artificial playgrounds and fun spots. It hastens the already unmanageable flow of displaced persons to our metropolitan slums, fringe areas, and economic ghettoes, or to the shadow world of migratory labor. By maximizing the local dependence on national markets, on imported equipment and necessities, and on mass transportation, by failing to make use of whole sectors of local resources, it adds to the already enormous national drain on energy, strategic minerals, water, and even land. In short, examined in a broader frame of reference than that provided by the concept of "economics of scale" and by the calculus of investment, its claim to comprehensive efficiency and scientific validity is very dubious.

For such reasons I feel we must give increasingly serious attention to an alternative philosophy of economic advancement which emphasizes quite different goals, values, and techniques. This philosophy suggests that the essential "infrastructure" for the uplands and for many other regions like it, is not a system of giant dams and superhighways, but a thriving permanent population sustaining a way of life ecologically adapted to the regional environment. It suggests that this way of life must be essentially "bioeconomic," that is, dependent on the skillful utilization of primarily biological flow-resources and on close adaptation of logistic arrangements and productive facilities to the regional topography and biotic patterns, rather than on high energy machine technology and large-scale commerce. It suggests that the place-rooted community, with access to an adequate geographical base, and embracing within its membership a considerable range of differentiated and complementary human skills, is the normal and efficient embodiment of these principles. It suggests that real capital formation in communities of this kind can proceed effectively without the accumulation of debt, through the application of self-directed labor to cost-free indigenous materials, and that this process can lead to a wide diffusion of small-scale productive installations which can aggregate to impressive totals and can result in a highly evolved cultural and economic landscape. It suggests that it is this pattern of "bioeconomic" growth which must be facilitated in the uplands, both because it offers the only efficient type of human use of such a region, and because it offers our best hope of solving the problems of resources-management and conservation which press upon us with the increasing maturity of our society.

## THE POTENTIALS OF THE REGION

I would like now to offer the proposition that the existing traditional pattern of Hispanic settlement in the northern New Mexico uplands is a remarkably coherent expression of this principle of land use and economic organization—primitive and incomplete, no doubt, but uniquely suited for an evolutionary development towards the essential bioeconomic community of the future.

Through an apparent—but only an apparent—paradox, the very aridity and ruggedness of the regional terrain has much to do with this favorable circumstance. In such an environment, the logic of topography and of hydrology strongly determines the conditions of human life. Here the watershed is no mere geographer's abstraction, but a microcosm to which social organization must quite specifically adapt itself. Its upper boundaries are usually steep and not conveniently crossed by roads; its drainage sump contains generally the only land suitable for settlement and intensive cultivation; and all social and economic activities of necessity ebb and flow through it. Additionally, the control and management of the water collected and sharply concentrated by gravity here imposes on the community an incentive for collective action internally, and a collective external responsibility to water users on the lower reaches of the stream system which the watershed feeds. Finally, the considerable range in elevation and climatic zones usually embraced within such a microcosm results in a corresponding range of biotic resources which encourages a healthy degree of internal differentiation in economic activities.

Figure 7, traced from the Soil Conservation Service's map of small watersheds in New Mexico, indicates the intricate mosaic of such microcosms which compose the "uplands." Over 60 such units can be identified, averaging about 200 square miles each in surface area, and each containing usually at least one node of settlement. *Figure 8*, reproduced from a study by the U.S. Agricultural Research Service, shows the fine-scaled subdivision of small holdings in the irrigated bottomland of one of the longest-settled of these sites, that of Santa Cruz near the ancient first capital of the province. Note in the smaller scale diagram at the lower center, the small proportion this irrigated sector bears to the total watershed area. *Figure 9* depicts a larger drainage basin, that of the Puebla and Santa Barbara streams which

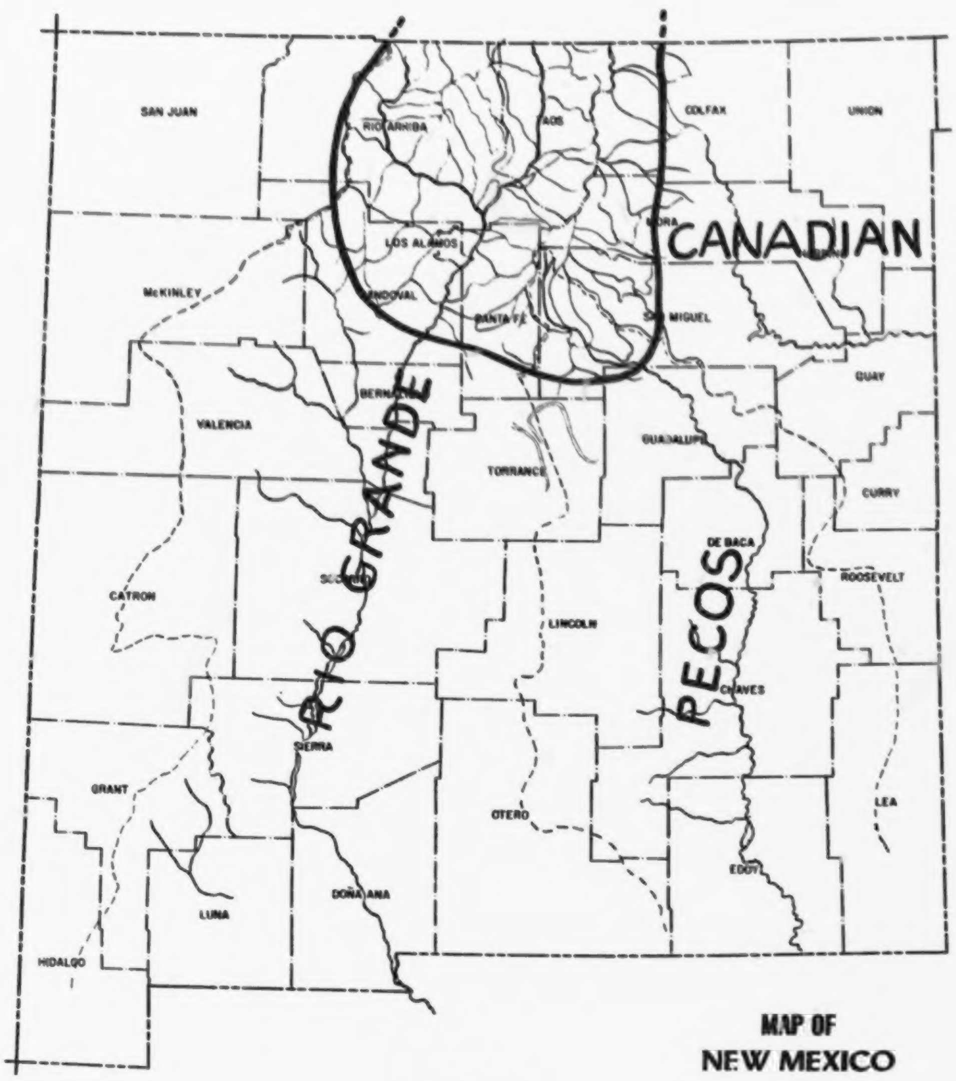

SAN JUAN
RIO ARRIBA
AOS
COLFAX
UNION
ORA
CANADIAN
LOS ALAMOS
McKINLEY
SANDOVAL
SANTA FE
SAN MIGUEL
BERNALILLO
VALENCIA
QUAY
GUADALUPE
TORRANCE
CURRY
RIO GRANDE
DE BACA
SOC
ROOSEVELT
CATRON
LINCOLN
PECOS
CHAVES
SIERRA
GRANT
OTERO
LEA
EDDY
LUNA
DOÑA ANA
HIDALGO
MAP OF
NEW MEXICO

FIGURE 7

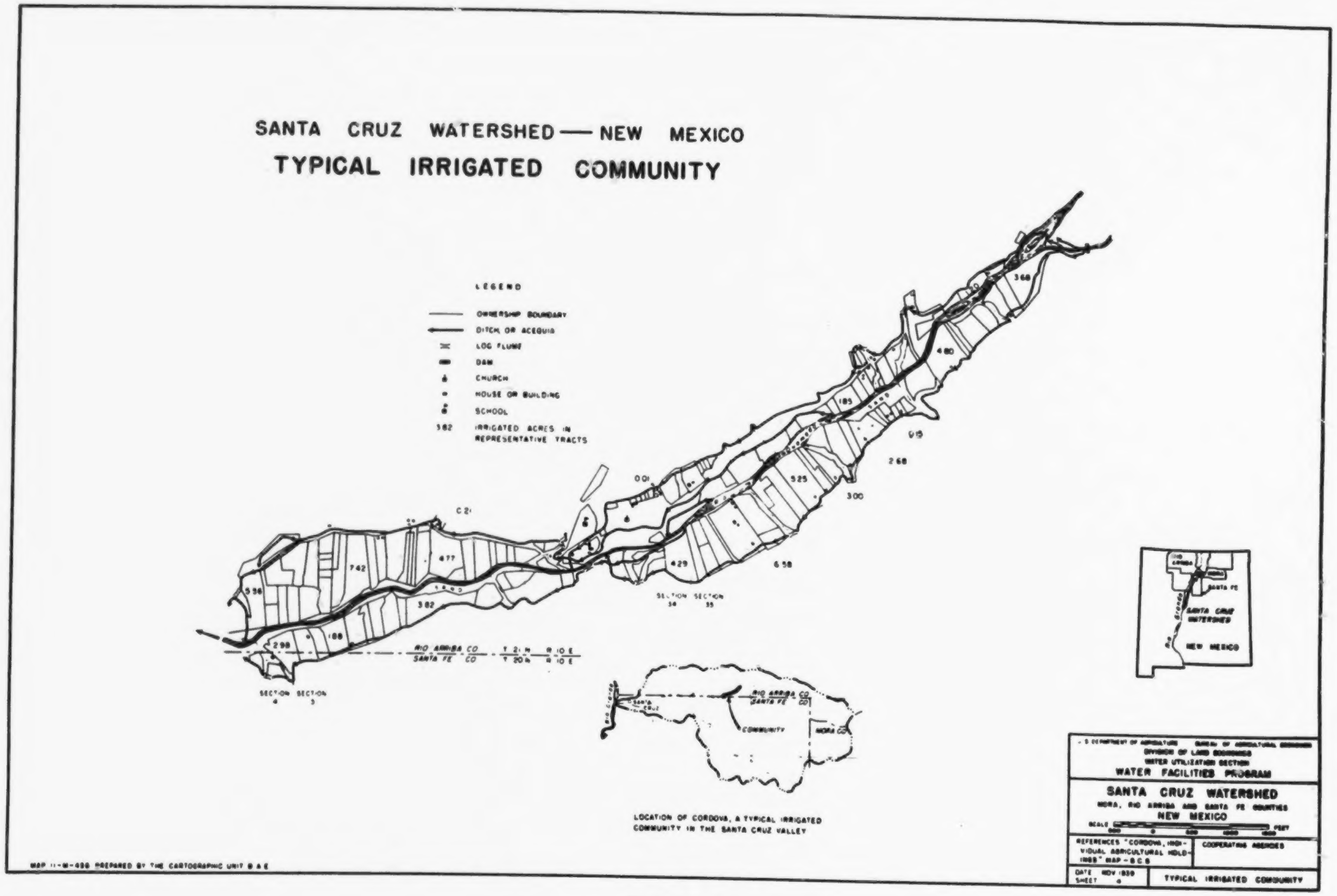

SANTA CRUZ WATERSHED — NEW MEXICO
TYPICAL IRRIGATED COMMUNITY
LEGEND
OWNERSHIP BOUNDARY
DITCH OR ACEQUIA
LOG FLUME
DAM
CHURCH
HOUSE OR BUILDING
SCHOOL
382 IRRIGATED ACRES IN REPRESENTATIVE TRACTS
368
480
185
515
268
300
525
001
C21
658
429
742
477
382
536
298
186
SECTION SECTION 34 35
SECTION SECTION 4 3
RIO ARRIBA CO T 21 N R 10 E
SANTA FE CO T 20 N R 10 E
RIO ARRIBA CO
SANTA FE CO
MORA CO
COMMUNITY
SANTA CRUZ
LOCATION OF CORDOVA, A TYPICAL IRRIGATED COMMUNITY IN THE SANTA CRUZ VALLEY
SANTA FE
SANTA CRUZ WATERSHED
NEW MEXICO
WATER UTILIZATION SECTION
WATER FACILITIES PROGRAM
SANTA CRUZ WATERSHED
NEW MEXICO
SCALE
FEET
REFERENCES "CORDOVA, INDIVIDUAL AGRICULTURAL HOLDINGS" MAP - S C S
COOPERATING AGENCIES
DATE NOV 1939
SHEET 4
TYPICAL IRRIGATED COMMUNITY
MAP 11-M-498 PREPARED BY THE CARTOGRAPHIC UNIT B A E

FIGURE 8

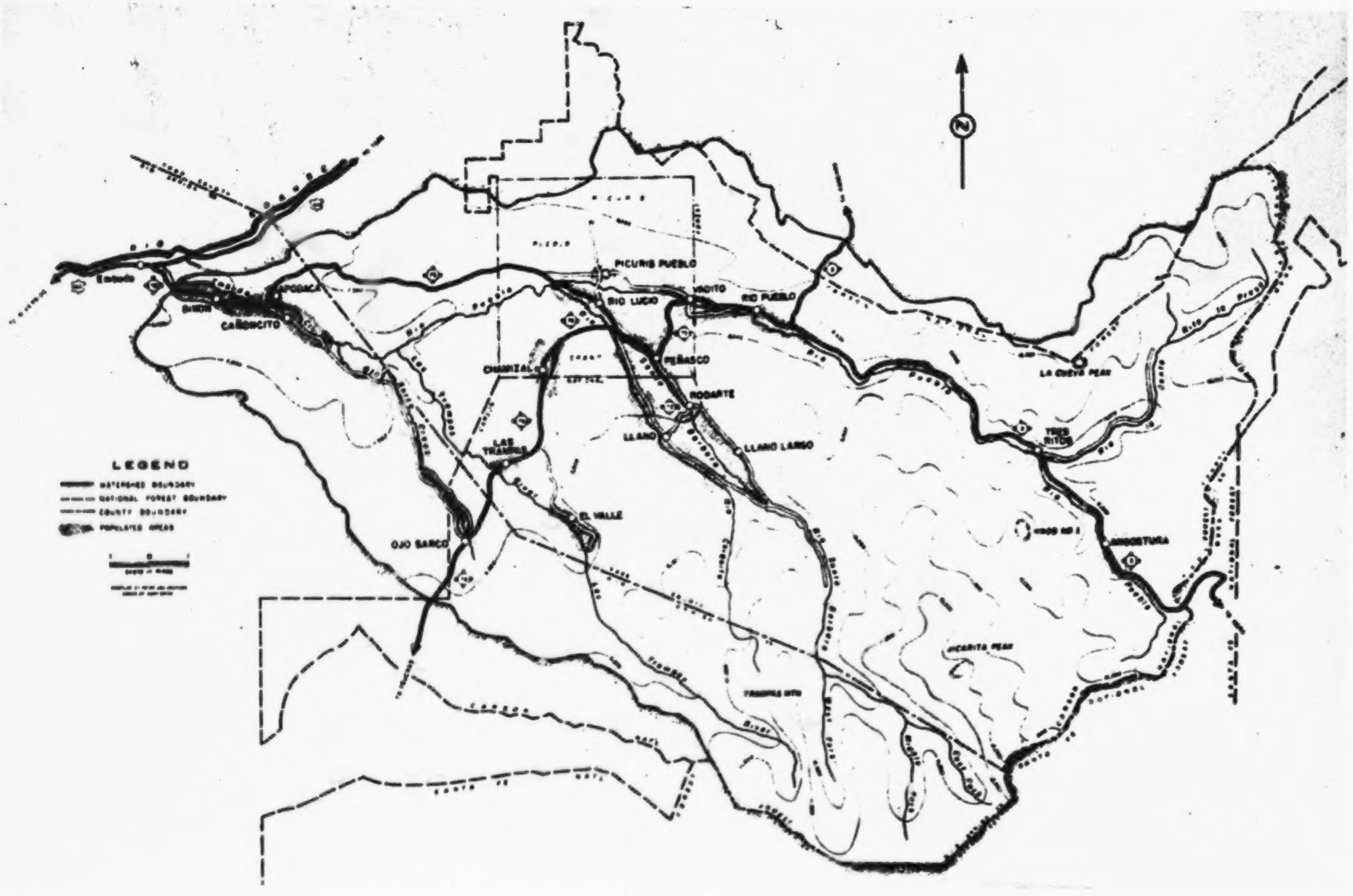
N
Embudo
DIXON
APODACA
CAÑONCITO
PICURIS PUEBLO
PUEBLO
RIO LUCIO
VADITO
RIO PUEBLO
PEÑASCO
CHAMIZAL
RODARTE
LLANO
LLANO LARGO
LAS TRAMPAS
EL VALLE
OJO SARCO
LA CUEVA PEAK
TRES RITOS
ANGOSTURA
JICARITA PEAK
LEGEND
WATERSHED BOUNDARY
NATIONAL FOREST BOUNDARY
COUNTY BOUNDARY
POPULATED AREAS

FIGURE 9

discharge an annual 74,000 acre-feet of water into the Rio Grande at Embudo. This "microbasin," is it might be called, contains some seven or eight hamlets and villages (including one small pueblo) and supports a range of land uses from intensive orchards at the lower levels to hunting, skiing, and spruce timber harvesting at the higher.

As I have already suggested, most of these nodes of settlement should properly be regarded as urban microcosms, not mere haphazard collections of small farms. Over the centuries they have performed, on a miniature scale, many of the essential organizing functions for the regional economy. Within them have been elaborated the techniques for building construction from indigenous materials (adobe, timber, caliche plaster), the simple but effective hydraulic engineering practices needful for local irrigation systems (Figure 10), the skills of food preparation and preserving, the craft of blacksmithing,

(Photograph courtesy of New Mexico State Tourist Bureau)

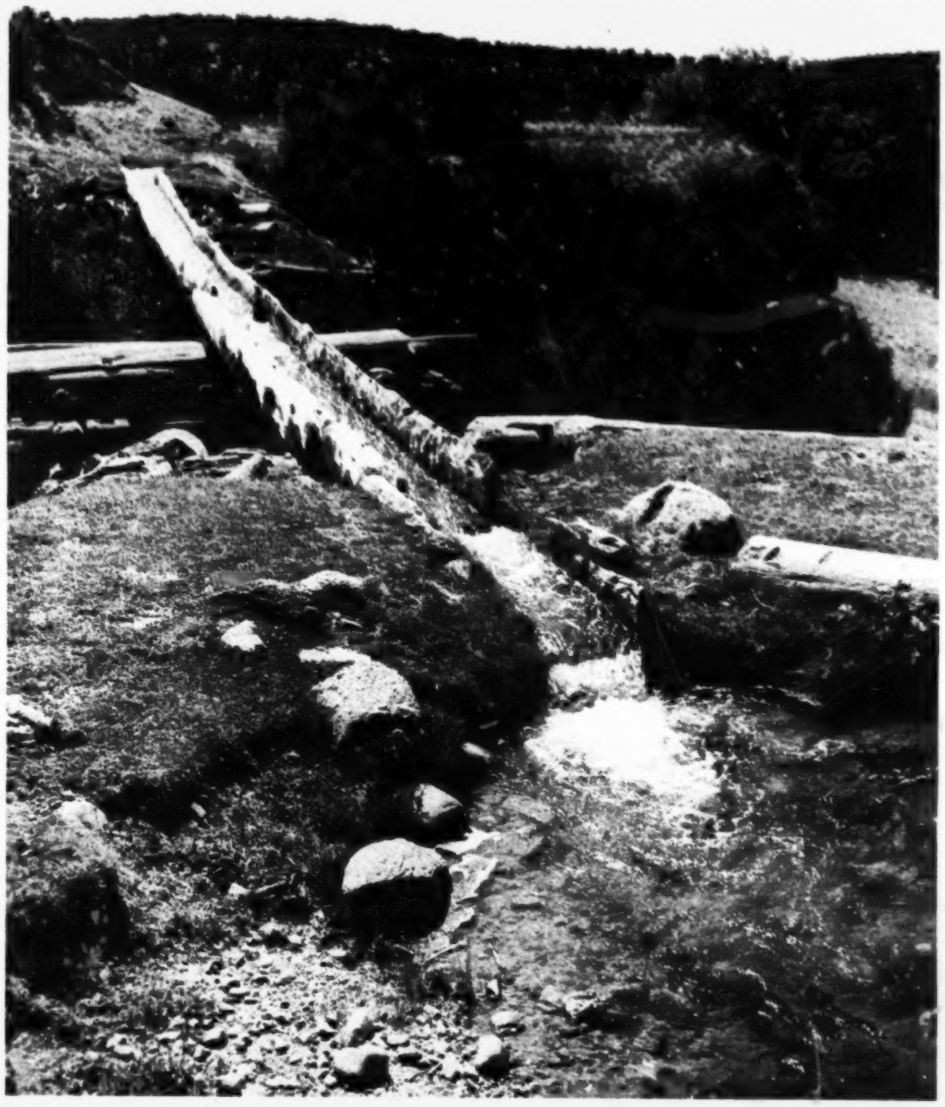


*FIGURE 10*

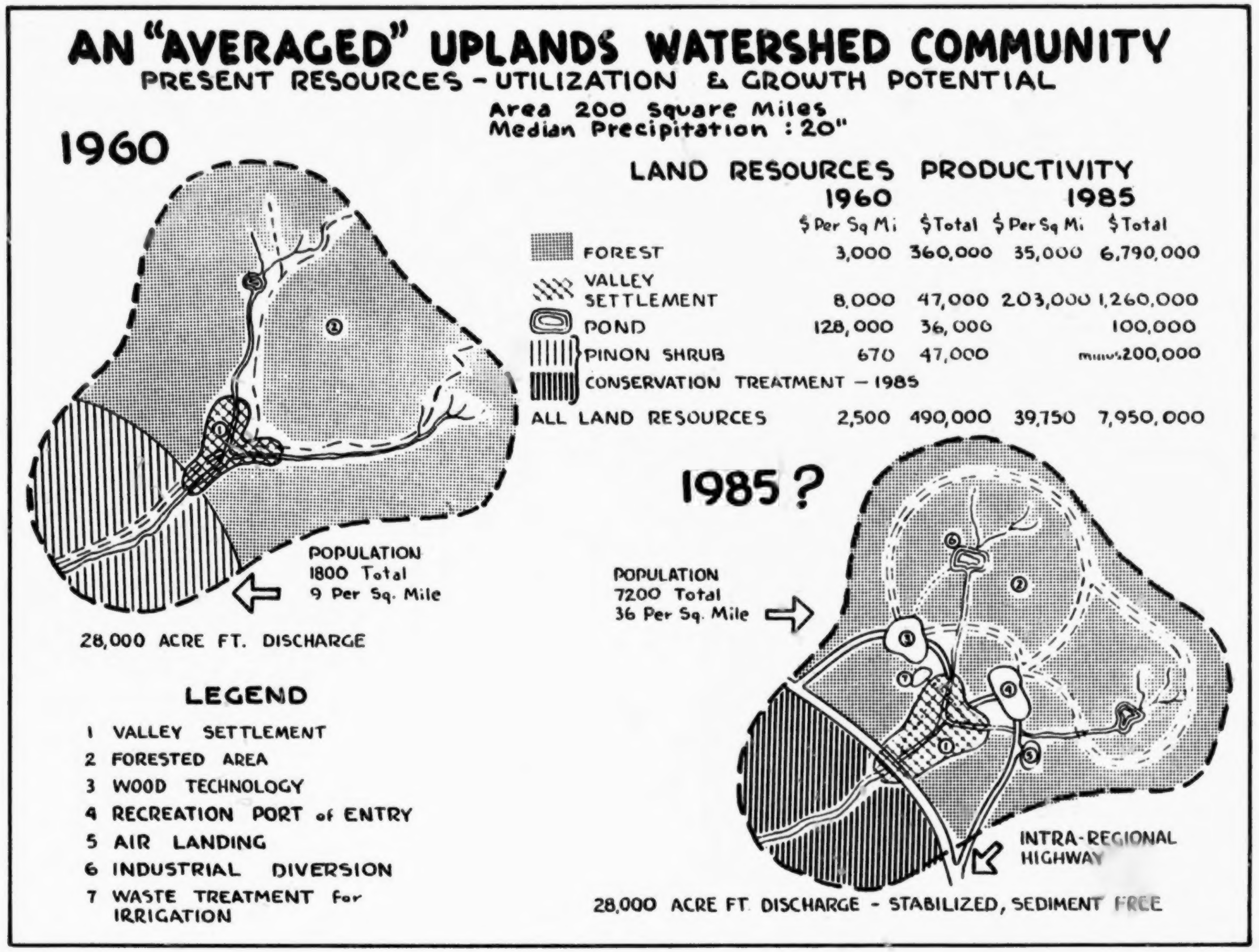
mill- and wainwrighting, weaving, woodworking, tanning, and harness-making, the institutional arrangement for the management of *ejidos* (communal grazing lands) and *acequias* (community irrigation ditches). Much of this knowledge was brought from similar mountain areas in the Spanish homeland, some was adapted from Pueblo Indian practice. Some has vanished almost completely in recent decades, some is still in daily use.

Ritual and sacrament combined to fortify the civic and communal awareness of each such urban microcosm. A patron saint watched over the fortunes of each, and fiestas and processions periodically celebrated this guardianship. Civil administration through the local *alcalde* and economic coordination through the *majordomos* and *patron* further reinforced this homogeneity.

It would be a serious mistake to suppose that the march of technology has obsoleted the fundamental logic and the functional validity of the resulting pattern of land use. On the contrary, I believe this pattern offers a very remarkable potential for extension and for refinement to a high level of efficiency. Let me now ask your indulgence for a few minutes of pipe-dreaming as to the possible results of such an extension and refinement.

*Figure 11* depicts in schematic form a typical uplands watershed community or microbasin as it exists in this decade (the left-hand figure in the diagram), and as it might evolve under an enlightened development philosophy (the right-hand figure). Note first that the focus or node of settlement—the traditional village shown at the forking of the principal stream (area 1 in the diagram) has not only retained but strengthened its strategic position over the quarter-century interval. It has not been flooded out by a high level dam, butted by a superhighway, or leveled for a commercial ranch site. Its population has, in fact, at least doubled, perhaps trebled. In short, it is continuing to serve as the essential, even if miniature, metropolis for the thriving economic and social life of the microbasin.

A new generation of skilled forest and rural technicians and their families lives in this village and works almost continuously throughout the 200 square miles of the watershed lands. These are largely the sons and daughters of the present regional population who have benefited by challenging training and research programs carried on locally and who have a personal stake in the overall enterprise. As a result of this training, and of carefully worked out agreements between government agencies, local land-owners, and the local community, the entire watershed is now operated as an integrated ecologic system. Large sectors of second-growth, of insect- or fire-damaged forest inherited from previous generations have been brought to full yield and beauty through unprecedentedly intensive silvicultural practices. Vegetative management, extensive mulching, contour furrowing, and multiple check-dam construction have maximized soil moisture content, increased subsurface percolation and storage of water, and stabilized stream flows. Livestock has been considerably expanded but, by scientific deployment in relation to cover types and seasonal changes, has been kept a positive factor in the ecologic balance. An extensive complex of trails, camping sites, hostels, lodges, wells, and small dams designed by skilled landscape and park architects has been constructed and is in constant use by visitors from the the lowlands. Moderate use-fees paid by these visitors defray the cost of supervision and maintenance of these facilities, and add to local employment and community revenues.


AN "AVERAGED" UPLANDS WATERSHED COMMUNITY
PRESENT RESOURCES - UTILIZATION & GROWTH POTENTIAL
Area 200 Square Miles
Median Precipitation : 20"
1960
POPULATION
1800 Total
9 Per Sq. Mile
28,000 ACRE FT. DISCHARGE
1985?
POPULATION
7200 Total
36 Per Sq. Mile
INTRA-REGIONAL
HIGHWAY
28,000 ACRE FT. DISCHARGE - STABILIZED, SEDIMENT FREE
LEGEND
1 VALLEY SETTLEMENT
2 FORESTED AREA
3 WOOD TECHNOLOGY
4 RECREATION PORT of ENTRY
5 AIR LANDING
6 INDUSTRIAL DIVERSION
7 WASTE TREATMENT for IRRIGATION
1
2
3
4
5
6
7

LAND RESOURCES PRODUCTIVITY

| | 1960 | | 1985 | |
|---|---|---|---|---|
| | $ Per Sq Mi | $ Total | $ Per Sq Mi | $ Total |
| ▩ FOREST | 3,000 | 360,000 | 35,000 | 6,790,000 |
| ▨ VALLEY SETTLEMENT | 8,000 | 47,000 | 203,000 | 1,260,000 |
| ◎ POND | 128,000 | 36,000 | | 100,000 |
| ▥ PINON SHRUB | 670 | 47,000 | | minus 200,000 |
| ▥ CONSERVATION TREATMENT - 1985 | | | | |
| ALL LAND RESOURCES | 2,500 | 490,000 | 39,750 | 7,950,000 |

*FIGURE 11*

Judicious site- and circulation-planning has channeled the "export" activities of the watershed community in harmony with this concept of organic and ecologic integrity. A good intra-regional road (brown in the diagram) touches the village and provides convenient access to the rest of the region and to major continental highways, but is deliberately routed away from scenic and settled valleys. A short spur connects this road with a recreational "port of entry" above the village (area 4) which provides good access to the forested highlands. Here campers and hikers may park their cars safely, hire horses if they wish, and enter the trail system. Perhaps there is even a small hovercraft field (area 5) for tourists arriving by private aircraft.

A similar spur connects to an industrial site (area 3) where any relatively large technical or industrial processes may be carried out. These will depend on the characteristic biotic pattern of the watershed, and the particular interests and entrepreneurial skills of local groups and the community. This site will most probably contain at least an efficient and permanent sawmill of a capacity proportioned to the sustained yield output of the tributary forest zone. This may be supplemented by a number of byproducts-using installations—fence-post, pole, shingle, or molding mills, and the like. Fertilizers and mulches for local use may be produced here from bark and other wastes. Fuel, both solid and gaseous, sufficient for the entire watershed community, may also be a valuable byproduct. Other specialized production based on the adjacent biotic yield—as meatpacking, tanning, and woolscouring—may be carried on here, at a relatively small but efficient scale, for the domestic and regional market.

Processed water may be supplied to this site from an upstream impoundment (area 6) but after use it is clarified at a treatment lagoon (area 7) and re-used for irrigation of non-food crops downstream.

Note that the great bulk of the capital improvements here sketched are the result of labor applied directly to easily available raw materials, with simple tools. They can be achieved with a minimum of borrowing or outside investment. They consist of such things as trails, fences, corrals, small earth-and-rock dams, dug wells, log-and-stone buildings, land and standing timber treatment. Large-scale power machinery would be required only at a very few points in the operations of this "bioeconomic" complex. Motorized equipment, for example, would be neither necessary nor desirable in the entire forest area. Sustained yield timber harvesting in a multiple-use setting could most effectively be carried on by an ancient and efficient invention (the draft horse), while the logistically efficient location of the sawmill and its auxiliaries reduces the transportation requirements to a minimum. The art of breeding and utilizing zoologic horsepower would be rediscovered and re-applied.

Similarly, recreational policy would be deliberately planned to satisfy the large and growing national demand for the selective personal wildlife experience, not dependent on elaborate facilities.

The renaissance and restoration of the village itself would most directly embody this principle. The traditional architecture of adobe, timber, and stone would be strengthened and enriched, yet construction would remain on the largely do-it-yourself basis it has always been, and the home mortgage would be as rare a phenomenon as it was in 1960. The local *acequias* and the irrigated croplands of the village site would be improved by better lay-

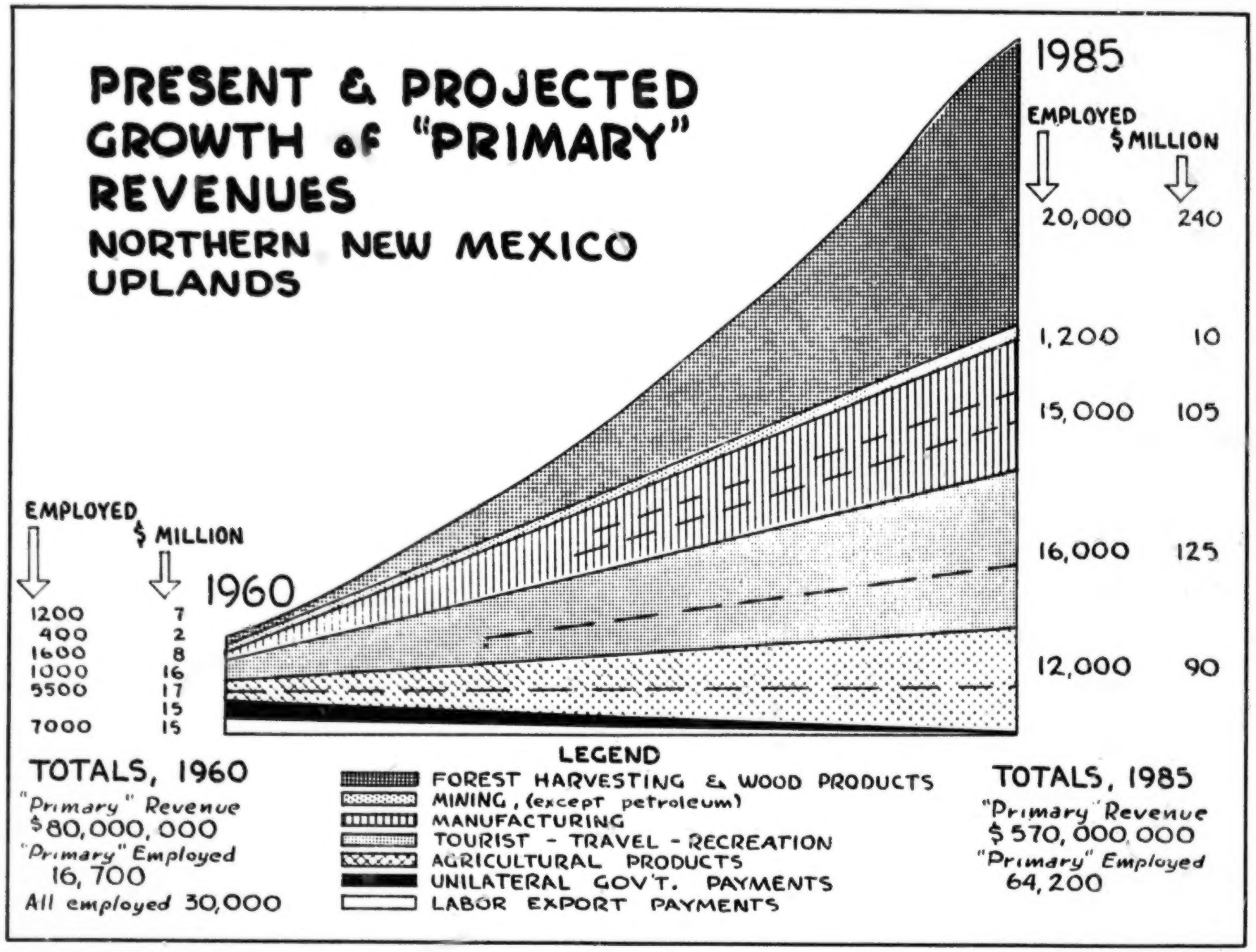

PRESENT & PROJECTED GROWTH of "PRIMARY" REVENUES
NORTHERN NEW MEXICO UPLANDS
1960
1985
EMPLOYED
$ MILLION
1200 7
400 2
1600 8
1000 16
5500 17
15
7000 15
20,000 240
1,200 10
15,000 105
16,000 125
12,000 90
TOTALS, 1960
"Primary" Revenue $80,000,000
"Primary" Employed 16,700
All employed 30,000
LEGEND
FOREST HARVESTING & WOOD PRODUCTS
MINING, (except petroleum)
MANUFACTURING
TOURIST - TRAVEL - RECREATION
AGRICULTURAL PRODUCTS
UNILATERAL GOV'T. PAYMENTS
LABOR EXPORT PAYMENTS
TOTALS, 1985
"Primary" Revenue $570,000,000
"Primary" Employed 64,200

FIGURE 12

out, by ditch-lining, by terracing and scientific soil-conditioning, and would be largely converted to high value vitamin and protein-production for domestic consumption or the local market. But this would remain essentially a spare-time family and subsistence activity, not warranting the tractor and the big-field investment of commercial agriculture.

The village itself would no doubt also provide the setting for a variety of skill-intensive small-scale enterprises. These might include cottage and craft industries using indigenous raw materials as well as inns and summer places catering to travelers desiring interesting vacation destinations rather than one-night stopovers on main highways. No doubt specialized and advanced precision industries, on the Swiss pattern, would also find a suitable environment here. Finally, one would expect that local pride and initiative would lead to the embellishment of the village with such amenities as a library, a restored plaza, a *mercado,* a theater, perhaps a rodeo, sports, and fairground, and other civic adornments embedded in the Hispanic tradition and of perennial value and validity. It is hardly necessary to add that a strong public school, well oriented to the community, would be an indispensable local institution.

Our contemporary *hubris* of the big project and the mechanized mass operation makes it extremely difficult for us to take such proposals seriously. I would therefore like to conclude this speculation with a graph (Figure 12), which shows the results of a rough attempt to estimate what the dollar value, in today's market, might be of such a thoroughgoing program of agrestal management and grassroots development in the northern New Mexico uplands, over a 25-year period.

The left-hand ordinate represents the dollar value of the various 1960 "primary" regional revenues which I discussed earlier in this paper. Excluding imported funds, manufacturing value-added and mine output, the remaining revenues, amounting to about $40 million, may be ascribed to the use of biotic and environmental resources—forest products harvesting and processing, the recreational "industry," and agricultural production.

The right-hand ordinate, representing a mythical 1985, shows the dollar amount of these same revenues as they would stand if a program such as I have outlined above had been successfully carried out in each of the 60-odd watershed communities of the region. To arrive at these figures I have, of course, had to make some rather sweeping assumptions as to the recreational "carrying power" of wildlands, the probable yearly output of mixed conifer forests in semiarid climates under optimum sustained-yield management, and the manpower requirements of a highly intensive program of agrestal management. I have used such factual source material as was available, and I believe the order of magnitude of the cumulative total— about $400 million— to be reasonable. This represents a tenfold increase over the corresponding values for 1960.

The labor force necessary for such a combined "output" I estimate at about 50,000—roughly a fivefold increase over the number engaged in the corresponding "primary" activities in 1960. The actual distribution of income is, as usual, very difficult to estimate, but since, due to the nature of the process of capital formation, a minimum of debt-servicing would be involved, and since much of the capital installation would be either small-scale and privately owned, or cooperatively administered, it is reasonable to assume that the actual per capita income would approach the average, and would be about twice that of 1960. This rough calculation makes no allowance for the contributions of the subsistence sector of the regional economy, which would be much larger absolutely, and somewhat larger, proportionately, than they were in 1960. Nor does it assign any value to the overall improvement in water yield, flood retardation, sediment control, and aquifer recharging, which could be of major benefit to the three principal drainage basins.

That social and economic benefits of this order of magnitude, contributing to both local and national wellbeing can, in principle, be achieved by a simple grass-roots type of technical and organizational development in a region of this kind, and that the cultural tradition and the social morphology of the region favors such a development, seems to be highly significant. I believe I am justified in feeling that this "bioeconomic" approach to economic development offers the key to one of the most perplexing problems facing society today.

In summing up, I suggest that this grassroots "bioeconomic" approach to regional development offers in principle a very remarkable potential for economic and social benefit. This benefit can be realized without large-scale subsidies or investments, and without the traumatic displacement of a deeply rooted culture. It can accrue to both local residents, the state, and the whole nation. It can be realized by reasonable and feasible programs conceived in harmony with both the physical realities of the terrain and topography, and the basic dynamic of the regional culture. I suggest it is worth at least as serious and intensive study as is now devoted to the alternative rationale of big-scale investment, monolithically administered projects, and giant public works.

# Adaptations for Successful Living in the American Semiarid and Arid West

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## INTRODUCTION

The purpose of this paper is to identify some cultural traits and patterns that appear to be adapted to environmental conditions in the semi-arid and arid American West. They can serve as models for discovering additional adapted practices, and thus contribute to a more suitable total way of living in these regions and in other countries with similar conditions.

Most aspects of present human behavior in the semi-arid and arid American West are not adequately suited to the conditions that prevail in the West. And these unsuitable ways, rather than the facts of aridity and semi-aridity, are the explanation for some of the basic problems. These problems will continue until there is a reasonably suitable total way of life. The original mal-adaptations occurred because the American cultural heritage that was projected upon the semi-arid and arid West was humid-area centered, and continues to be so, by virtue of its European origin and its East Coast and Midwest historical roots and bias.[1]

This paper will fall into three distinct parts as follows:

(1) Identification of adapted traits and patterns for successful living in the Great Plains;
(2) Identification of some adaptations for successful living in the arid West, and the positing of a thesis that there are barriers in the arid West to the development of further adaptations; and
(3) Advancing the hypothesis that these barriers to further adaptations will mean the limitation of maximum population-resource development in the United States and in other arid and semi-arid parts of the world.

## SOME ADAPTED TRAITS FOR THE SEMI-ARID GREAT PLAIINS

Whatever else a nation may require, it must apparently provide the following three conditions in order to be great.[2] These are:

(1) Certainty and stability of income;
(2) Certainty and stability of contract performance; and
(3) Certainty and predictability of future income—cost relationships.

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[1] This has been the conclusion of historians, social scientists and natural scientists too. The late Walter Prescott Webb developed this thesis in his classic book, *The Great Plains*, (Ginn and Co., 1930). The natural science evidence in this respect is set forth in *Aridity and Man*, edited by Carle Hodge and published by the American Association for the Advancement of Science, (1963). From the social science standpoint, a treatment, by the author of this paper, is that found in *The Great Plains in Transition*, Oklahoma University Press, 1955.

[2] See Kraenzel, Carl F., *The Great Plains in Transition, Ibid.*, p. 286.

In the early history of the United States, when the nation was predominantly agricultural, these three underpinnings were inherent in the humid nature of the climate—regular and predictable rainfall in sufficient amounts to support stable agriculture, and, therefore, a flourishing total social system.

This humid based agricultural way of life was soon complemented by industrial and urban development. This meant, not alone increased resources and opportunities, but also increased stability. The processing of resources involved not only those of the humid area but much of those of the semi-arid and arid West. Furthermore, control over such resources and processing meant not only added opportunities but added stability. In addition, other devices to create stability were deliberately developed, mainly: the insurance system on all levels, including unemployment; bank and savings deposit guarantees; corporate ownership and control devices to assure ongoing business organization; full employment legislation and public works programs for periods of recession and depression; stable financial management in the form of a regular flow of credit through discount and rediscount devices, reserve and deposit requirements and adjustments in these; income tax manipulation to foster stable economic growth; and other devices similar to these.

It is apparent from what has gone before that these conditions for certainty and stability are essential and basic for the encouragement of the "roundabout system" of production typical of a strong nation. The semi-arid and arid West, west of the 98th meridian, inherently lack the kind of certainty and stability of income that is typical of the East and the Midwest. Certainty and stability of contract performance have, therefore, always been less possible for the agricultural West. Certainty and stability of income-cost relationships have always been difficult to accomplish. The semi-arid and arid West, therefore, defined as "high risk" in investment, business and credit matters.

This definition of "high risk" was applied, chiefly, to the economic sphere, especially the financing and mortgage or debt repayment segment of the social system, particularly in the case of agriculture. The idea of "high risk" had not been applied to the social and institutional life such as road building, educational services, local and state government functions, church organizations, medical care and welfare services, and other group-type social services for people. It was felt, in the light of the Protestant Ethic, that in these things people could pull in their belts snugly, or let them out at the buckle, without distress and destruction to the services and to the morale of the people themselves. Recently, it has become apparent that there may be distress and destruction, as well as a loss in morale, in this taking in and letting out of the belt process.

Agriculture of the Plains especially, and to a limited extent that of the rest of the arid West, has learned of the prospects of making certain adaptations to the fact of semi-aridity and aridity. This has taken place for crop agriculture and for livestock ranching to a reasonable degree. The progress made in this respect can be grouped under three headings,[3] namely the development of:

(1) reserves;
(2) mobility; and
(3) flexibility.

---

[3] See Kraenzel, *Ibid.* Chapter 24 and related chapters.

The following are three examples of adapted techniques, one each for reserves, mobility, and flexibility.

## RESERVE BUILDING TECHNIQUES

Dryland agriculture is an invention to build reserves, in this case moisture reserves. Crops are grown with one year of current precipitation and one or sometimes two years of stored moisture from the previous non-cropping years. The specific techniques to accomplish this include alternate cropping, strip cropping, stubble mulch tillage, specific deep tillage implements, quick maturing varieties of grain, drought evading characteristics of crops, flexible loan repayment programs and other traits. Each of these traits has a complicated trial and error history of development, and their proper combination into a dryland agriculture pattern is a trial and error testing experience itself. Ranching, too, developed the idea of reserves in the form of stored feed as "black top" hay stacks or as ensilage, rotation pastures, water reservoirs for livestock, controlled grazing practices, cooperative grazing districts, grazing permits, homebase and grazing area integration and certain other practices; and today's pelleted feed concentrates have changed ranch management and operations in significant ways.

## MOBILITY CHARACTERISTICS

An example of mobility in the agriculture of the arid and semi-arid West includes the concept of area diversification which means that farmers and ranchers have some of their operations in the irrigated area and some in the dryland area, with headquarters in some kind of cluster in the irrigated area preferably, with mobility the key. Another example is the conjoint use of summer and winter range, often many miles apart with mobility of the livestock as the key to such land use. Often the dryland farmers live in the towns and travel between them and the farm locations. Often they have land in different locations, many miles apart, as an insurance against complete hail or drought loss. This has, in the past, been sneeringly described as "side walk" or "suitcase" farming, though presently it is considered an adapted way of farming and ranching for those fortunate enough to be able to practice it.

## FLEXIBILITY TECHNIQUES

Flexibility, a basic survival trait, has been developed in the area of credit for agriculture. It involves the idea of reserves also. Agriculture in the Plains demanded a credit system with flexible repayment periods and mortgage payment dates that coincided with the yield periods. Aware of this risk and uncertainty in agriculture, the Federal Land Bank and Farm Credit Administration experimented with the Future Repayments Program. Under this program, the farmer and rancher could make two kinds of repayment in years of "good income;" one, the regular principal and interest payment on the mortgage; the other, a reserve payment into a "futures fund." This futures fund would automatically supply the payments on the principal and interest in the "no income" or "low income" years. The only problem was to guess the maximum number of such risk years in the total life of the mortgage. The feasibility of this kind of credit instrument for agriculture has been tested again and again, and found adequate to the needs.

## OTHER ADAPTED TRAITS

The above kinds of adapted traits are generally available to individuals. There are group and institutional aspects of these practices too. Among these is the ever-normal granary program, for wheat chiefly, which was intended to store and carry production over from high yield to low yield years; but its reserve aspects were weakened by the surpluses brought on by a run-away technology. Another was the drought risk insurance program, an attempt to set aside yield, or income from yield, in high production years to serve as income to cover production and living costs during low production years; but this program, too, was stalled by the surpluses created by the run-away technology.

The current Federal income tax system, as it now applies to the Great Plains, requires adjustment because it takes a full, prescribed share of the income in the years of high production and permits no reserves to cover predictable operation costs and family living deficits for the low or non-income years. The Federal income tax rules, therefore, allow a carry-back and carry-forward bookkeeping procedure so that farmers and ranchers might renegotiate their income tax reports and so spread out their income and expenditures over a limited series of years. This, however, is not a forthright way of facing a basic problem that requires available cash and places the operators in a suspect and indefensible position. But an adapted procedure has been suggested, namely a system of liquid reserves to cover predictable operation losses and family living deficits in the form of tax-free certificates equal to the risk of income loss due to drought. This would appear to be a realistic approach to this problem in the region.

The above traits and patterns are specific examples of adaptations to the facts of semi-aridity and aridity—they are keys to survival. The fact, however, is that, with but minor and accidental exceptions, these practices are limited to dryland farming and ranching, and even here they do not have the necessary group and institutional sanctions to make them generally operative. For group services, such as elementary school or county financing, adapted practices such as these are not legal, and are dependent upon new legislative action. Furthermore, mainstreet and small city business, labor and professional people are residents of the region too; yet they have not learned to develop similar or like traits for survival; nor have they been well enough informed to put their shoulders to the wheel and introduce legislation to effect such adaptations in the institutional aspects of Plains society—the schools, local and state government, health and medical care programs, taxation and public financing, church organization, public welfare services, and other aspects of living.

Until such adaptations are made for mainstreet and small city residents too, and for institutional services, the semi-arid and arid West will continue to be relatively high risk and unstable areas. There is, for example, only one major difficulty facing the general use of the Future Repayments program enumerated above; this is that the program is not obligatory for the farmers and the ranchers, nor for the business people in the area, as ordinarily would be the case even in a humid area credit program. Bankers of the Plains are either uninformed about the Future Repayments program, or they are deeply prejudiced in favor of a simple humid area credit instrument. Since the ideas of reserves and flexibility are not obligatory for agriculture nor for any other segment of society, there are no real defenses against high risk lending except those of curtailing the loan and being stingy with credit advances.

There is one other adapted model of social organization that could render effective services to people of the Plains, this time found in the area of institutional services, namely public health and hospital administration. The sparsely populated Plains has farm and ranch people spread out all over the land, and also has many small trade centers. These have difficulty in maintaining the minimum of services, unless there is a proportionately higher per capita charge for such services, i.e., there is a social cost of space.[4] Also, because of the limited choice of services, people shop around among several trade centers and there is not basic allegiance to "community." All these things represent pressures to make for inadequate services in the smaller places and there is, therefore, a high degree of disorganization and pathology in community matters in the Plains.[5]

A possible answer to this pathology is the introduction of social organization to foster a constructive degree of division of labor, coordination, cooperation and interdependence between communities of varying size and between Sutland and Yonland communities especially.[6] An ideal model of such organization, formerly alluded to as growing out of public health and hospital organization, is that proposed by the late Joseph W. Mountin.[7] His proposal called for health centers in the smaller places, rural general hospitals in the somewhat larger places, and specialist as well as general hospital facilities in the still larger places, with effective interchange, coordination and cooperation among the personnel and facilities from the diagnosis stage, through the treatment and rehabilitation stages of patient recovery. There are a few concrete examples approximating this model in the Plains and outside it.[8]

The same kind of rational organization as in the case of hospitals, is in prospect for public health organization and services, nursing home organization, mental health clinics and services, and integration of school organization and services. The idea is already used in bookmobile library services—

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[4] Kraenzel, Carl F., *Sutland and Yonland Setting for Community Organization in the Plains,* Journal of Rural Sociology, Vol. 13, No. 4, Dec., 1953, p. 349 ff.; also see Anderson, A. H., *Space as a Social Cost* in the Journal of Farm Economics, Vol. 32, No. 3, Aug., 1930, p. 419. Dr. Maurice Kelso, Agricultural Economist, formerly of Montana State College and now of Arizona University, has also written on this subject.

[5] For studies emphasizing these aspects see, for example, Anderson, A. H., *The Expanding Rural Community,* University of Nebraska College of Agriculture, SB No. 464, September, 1961; Pedersen, H. A., and Peterson, Earl B., *Patronage Patterns in Central Montana,* Montana Agricultural Experiment Station Bulletin No. 578, May, 1963; Alexander, Frank and Kraenzel, Carl F., *Rural Social Organization of Sweet Grass County, Montana,* Montana Agricultural Experiment Station Bulletin 490, Nov., 1953; and Anderson, A. H. and Miller, C. J., *The Changing Role of the Small Town in Farm Areas,* University of Nebraska, College of Agriculture, SB No. 419, May, 1953.

[6] *Ibid., Sutland and Yonland Setting for Community Organization in the Plains,* p. 349 ff. See also Kraenzel, Carl F., "Pillars of Service in the Emerging Community of the Plains," *Journal of Health and Behavior,* Summer issue, 1964.

[7] *Health Service Areas,* Division of State Relations, U.S. Public Health Service, F.S.A., 1945, Public Health Service Bulletin No. 292.

[8] See *The Hospitals of Montana*: A basis for a *Coordinated Hospital-Health-Medical Care Program,* Montana Agricultural Experiment Station, Bulletin No. 456, Jan., 1949.

The Sagebrush Bookmobile.[9] It is apparent in the metropolitan shopping centers and the supplying of branch stores in such centers from a central warehouse; or in the banding together of several grocery store and shoe merchants into cooperative wholesale organizations in order to service their retail outlets more economically and efficiently.[10] It could be extended to school coordination and integration in place of excessive consolidation, and to local and county government coordination, rather than excessive consolidation.

## OASES SETTLEMENT OF THE ARID WEST

The Rocky Mountains and Far West have pockets of semi-arid climates in limited areas, similar to conditions in the Plains. Here, too, adaptations similar to those of the Plains are found. Dryland farming in the Palouse country of Washington is one example.

But, for the most part, the area west of the Plains is arid. It is a well-known fact that to live in the desert, it is necessary to adapt to it or perish.[11] This has meant that irrigation was necessary. Consequently, almost without exception, the population of the arid West lives in irrigated areas, and, therefore, in concentrated fashion on irrigated projects only. The adjacent resources—land, forests, minerals, upland waters, and desert land grazing—are used in conjunction with such irrigated oases to add to the resource base there.

Irrigation from surface water was not developed in the arid West; rather, the climatic conditions were so demanding that it was necessary to import the system bodily from the older arid parts of the world—without it, man could not have so quickly established permanent settlement in the arid West.[12] The specific method of rationing water, through the prior application doctrine (first in time, first in right), with its roots in mining law, as a substitute for the humid area riparian water doctrine, was, perhaps, an American invention. Underground water, lifted by pumping, is merely an extension of the principle, and the lack of systematic underground water regulation and control merely emphasizes the relative novelty of the priniciple of irrigation in this country. Whether, in its fullest extent, the Western Water Doctrine was first pioneered in California, or by the Mormans in Utah, or on the headwaters of the Platte in Colorado, must be settled by historians. The development of special crops and the scientific management of crops, water application and farming practices are, perhaps, no more significant than the evolutionary development of technology in America generally— the kind of scientific spirit that prevailed the nation over, and in the Plains, too, for irrigation developed there also.

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[9] The Sagebrush Library Federation, organized in July, 1959, included Carter, Custer, Fallon, Garfield and Powder River counties, an area of 16,831 sq. miles and a population of about 22,000. Miles City is the headquarters and people from as far as 150 miles away patronize the book-mobile. See *Montana Libraries*, Vol. XIV, No. 2, Jan., 1961, and also Vol. XVI, No. 2, Jan., 1963, and No. 4, July, 1963.

[10] In the Plains of Montana, the small town grocery merchants of Circle, Sidney, Glendive, and other Montana towns, formed such a cooperative wholesale organization in the late fifties. Likewise, a group of shoe merchants from Miles City, Glendive, Sidney, Wolf Point, Glasgow and other Montana towns, formed a similar pool.

[11] Thornthwaite, C. Warren, "Climate and Settlement in the Great Plains," *Yearbook of the Department of Agriculture*, (1941), p. 177 ff. See also Chapters 1 and 2 of *Aridity and Man*, American Association for the Advancement of Science, 1963, edited by Carle Hodge.

[12] For a discussion of irrigation see Huffman, Roy E., *Irrigation Development and Public Water Policy*, Ronald Press, 1953, especially Chapter 2 and 3 for early history; and also see Chapters 6 and 8 in *Aridity and Man, Ibid*. For a discussion of the Nile River Basin, see Hurst, H. E., *The Nile*, Constable, London, 1952.

The thesis advanced here, at the moment as a theoretical concept only, is that once irrigation was introduced in the arid West, that which was dry, was made wet, and not only agricultural but industrial and metropolitan development was encouraged, and the national humid area cultural ethos was able to thrive in the arid West. Only in those instances when settlement was, and is even now, pushed beyond the oasis area capacity, is there catastrophy.[13] A further correlary might be stated as follows: The rapid settlement of the arid West in the image of the humid East and Midwest was possible for reasons of national traditions and strategy—the tradition of the "Westward Course of Empire;" the goal of resource control and exploration; the need for boundary maintenance in the American West; the need for international trade, security and ocean control; and the consequence of the internal impetus that flows from the fulfillment of these basic purposes. Gold, fur, timber, fish, oil, other precious metals, space, congenial climate, scenery, ocean shipping, citrus and crop specialty agriculture, the processing of some of the local raw materials, certain strategic industries, a ready pool of industrial workers, venture capital, and population concentration in oasis-like fashion —all these made it possible for the arid West to develop in the image of the national cultural ethos.

To have and hold this arid West, the nation granted favors[14]—the maintenance of the public domain and extensive public recreation resources; the permit to extend oil exploitations under coastal waters and making inland oil producing states the "handmaidens" in this struggle; the granting of large sums of public funds for irrigation, public power development, labor and shipping development, and more recently, industrial development in the form of the airplane and space industry; tacit permission for the appropriation of interstate water for irrigation and industrial development by methods legal and extra-legal; and the predictably probable national subsidy to help devise ways of keeping salt water from invading the exploited inland coastal lands from which water was withdrawn ruthlessly to make wet that which was dry. These subsidies have permitted the tremendous growth of the oasis West. Except for great stretches of unpopulated distances between oases, the West is densely populated and in spots even more urban than much of the populated Midwest and East.[15]

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[13] The most recent example is the mid-March, 1964, burning of many homes in three vicinities of the Los Angeles area, a repetition of similar holocausts in other recent years. See the Great Falls Tribune for March 17 and 18, 1964. These result from the accumulation of man-encouraged vegetation beyond what nature can support, and when dry cycles occur, such vegetation becomes a fire hazard—man has extended himself beyond the limits of environmental potential. See also *Case History I, Tucson: A Problem in Uses of Water* by Wilson, Andrew W., in *Aridity and Man, Ibid.*, p. 483 ff.

[14] For a treatment of merely one phase of this, namely the army engineers-reclamation controversies and the involved pressure groups, see deRoos, Robert and Maass, Arthur A., *The Lobby that Can't Be Licked*, Harper's Magazine, Vol. 199, No. 1192 (Aug., 1949), pp. 15-20; and Maass, Arthur, *Muddy Waters: The Army Engineers and the Nation's Rivers*, Harvard Univ. Press, 1951, especially Chapter 5. For another issue, namely the Tidelands oil issue, see Bartley, Ernest R., *The Tideland's Oil Controversy*, Univ. of Texas Press, 1953. For brief descriptions of other aspects as in *Aridity and Man, Ibid.*, the following case history illustrations namely: *Case History* 2, *Upper Rio Grande: Embattled River* by Hay, John, p. 491, ff; *Case History* 3, *Embrudo: Rise and Decline of a Program*, by Imhoff, Edgar A.; *Case History* 4, *Rio Puerco: Abused Basin*, by Dortignac, Edward J.; *Case History* 5, *Los Angeles: Growing Pains of a Metropolis*, by Hall, Warren H.; *Case History* 6, *Central Valley: Water Use at its Maximum*, by Thomas, Harold E. Also see "Report to the President's Water Resources Policy Commission" (U.S. Government Printing Office, 1950), Vol. II, *Ten Rivers in America's Future*, especially the sections on the Central Valley of California, the Rio Grande, the Colorado, and the Columbia.

A hypothetical conclusion that can be drawn from the apparently factual situations that have been outlined is as follows: once given the irrigated oases for settlement, and certain agricultural adaptations, especially in the range livestock industry, the situations that flowed from the strategy of location made it possible for the arid West to emulate the national culture ethos without further significant modifications. The urban and industrial complex of the arid West appears not concerned with further adaptations to the fact of aridity; in fact, it serves as a barrier to the further seeking out of adapted ways for the semi-arid and arid West.

## LIMITING EFFECT FOR CULTURAL DEVELOPMENT ATTENDANT UPON THE LACK OF ORIGINALITY IN THE ARID WEST

In the light of the basic dilemma for the agriculture of the West, highlighted by the failure of the wheat referendum in 1963 and the price difficulties of the livestock industry in 1963-64, both representing the core of the basic economic life of the semi-arid and arid West, and in the face of the urban arid West deserting the task of seeking out and testing adapted techniques for survival under conditions of semi-aridity and aridity, several concluding statements, in hypothetical form, need to be set out. One such statement is that the struggle to establish adapted ways is so hopelessly impossible that it is wise to terminate this struggle. This can be done by contracting settlement drastically and maintaining a settlement of only that portion of the arid and semi-arid West that is absolutely essential to national life. An alternate statement is that the nation must take the long view and must maintain the current extent of settlement and use pattern. This could be accomplished with the aid of regionalism, and in the spirit of tolerance, allowing for changes consistent with the social and technological trends inherent in the national cultural ethos.

If the second alternative is the course of action to be elected,[16] then certain other actions would need to follow if what has been set out in this paper has any merit at all. First of these follow-up actions is to do the necessary things that would aid in getting established, as part of the Great Plains way-of-life, the adaptations that have been indicated, and extend these to the remainder of the Plains social system. This will not be an easy task because all the states that project into the Plains also project into the non-Plains peripheral areas, and it is here that there are the cities of the Plains states, and also the growing population that would need to be educated. Because of the absence of cities in the Plains proper, it is clear that the region will require the help of cities and agencies from outside the region if there are to be effective adaptations.

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[15] For example, for approximately equivalent sized land areas in the Ohio Valley, in the Metropolitan Strip area from Massachusetts to South Carolina, and for the three Western arid states, the average service area size for population centers of 10,000 and over, had a radius of 15.3 miles, 11.5 miles and 20.7 miles respectively, while for a portion of the Plains it was 74.2 miles. Respectively, 55.1 percent, 60.6 percent and 64.8 percent of the total population of the entire area lived within these centers of 10,000 and over, while for the Plains, only 31.4 percent of the population lived within such centers. For the three regions, the average radial distance to the peripheral area of service, for cities of 10,000 or over on the average, was 59.1 miles, 45.5 miles and 73.2 miles respectively, while for the Plains, even a radial distance of almost 300 miles brought none of the population to centers of such size. This urban emphasis in an arid region is referred to in both Chapters 13 and 14 of *Aridity and Man*. These chapters deal with economic, political and social aspects in arid regions.

[16] The author supports this second course of action. For a discussion of electoral, legislative and administrative processes involved in a democratic approach to resolving the complex problem of water use and priorities, and the setting out of a model design to accomplish this, see Maass, Arthur, *et al.*, *Design of Water Resource Systems*, especially Chapter 15, Harvard Univ. Press, 1962.

Another kind of followup action is for the cities of the arid West to recognize their vulnerability and form a partnership with the semi-arid Plains and in this way aid in seeking out and testing added survival traits for successful living under semi-arid and arid conditions. Should "peace break out in the world" the oases-settlements of the arid West would become vulnerable to economic catastrophy anyway. Fortunately, in place of a "war geared" economy, there appears to be an opportunity for "peace-geared" development: with the help of the instrument of true regionalism, the Great Plains and the arid West can build a way-of-life—a sub-cultural ethos—that, when fitted into the national ethos, can insure greater survival chances and can broaden the cultural base of the United States. By this step, the nation can demonstrate that cultural diversities, based on great geographic and climatic diversities, can be tolerated, and democracy can yet be strong.[17]

By this joining of forces, the Great Plains and the arid West could develop adapted ways for conditions of semi-aridity and aridity that can be used, not only at home, but also in the less developed nations of the world that are arid and semi-arid, too. It is not the techniques of Old World Civilization for living under conditions of aridity and semi-aridity that can bring about a new population-resource balance for which the underdeveloped parts of the world are striving, but new and improved techniques for such conditions. Many of these new techniques need yet to be discovered—not models in the image of ancient Babylon or ancient Cairo, nor in the image of the mobile tribes of the Near and Middle East, but models that the American West has started to invent and can bring to full fruition.

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[17] Political scientists have clear ideas how power can be distributed and diffused in a democratic manner, even for powerful state. See, for example, Maass, Arthur (editor), *Areas and Power*, The Free Press, 1959.

# An Architectural Approach to an Environment for Peoples of the Southwest

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## INTRODUCTION

I consider it a privilege to be able to present a paper at this conference. This paper is not the result of direct research. It is rather a composite of ideas concerned with an approach to architecture in terms of environment. And in this case the terms of environment have particular reference to the Southwest area of the United States.

In 1962 my wife and I had the good fortune to be involved in a study sponsored by the Rockefeller Foundation, through the auspices of Colorado College in Colorado Springs. It was a study directed towards discovering factors governing the social, cultural and physical attitudes in our western mountain-plains area—factors focused on the eventual enrichment of community life in this area. The direction of this Civic Design Study was somewhat unique in that it approached the settlements of man, not in the usual sense of urban studies, but as the settlements of people related to their natural environment, their history and their social, economic and political concerns. This approach gave the study group an opportunity to view the urban and rural scene from a wide latitude which was inscribed by its natural elements, in particular by its dominant climate control, arid and semi-arid. A control that has affected and affects now not only the natural earth cover, animal life and land resources, but the human resources, their history and inventions as well.

Such a wide overview of the land and its people did much to stimulate my own individual concern as an architect in discovering new guide-lines. Had any singular directive or any mono-purpose subjects such as "How will our cities survive?" or "What's wrong with traffic patterns?" been present, these guide lines could not have evolved.

Further, I would like to add that much of what I am going to say has been said before, in a number of ways, in a number of places and by a number of people. The repetition of such ideas inspires the continual hope that such projections will bring architecture back into focus—not only as an art form, not only as an expression of applied science, or even as a physical record whereby history may be interpreted—but more importantly, to bring architecture into focus as an aid in bridging the growing gap between the humanities and the sciences, between the creative expressions of our society and the scientific breakthroughs, and between the people and the technology.

## A PHILOSOPHY OF PLANNING

In my view from the bridge, so to speak, I suggest that primarily man finds himself at the center of his own universe in a bio-physical milieu faced with the natural environment of space, form and motion within that space on the one hand, and the need for resolving his philosophical orientation, out of which his dreams, desires and creative self emerge, on the other hand. Proceeding in architectural terms, the following points are offered as a starting point.

(1) All planning for man must meet the measure of his senses. However, the essential ingredient needed in planning for people may often be comprehended in full only through an understanding of their philosophic orientation. We usually stop just short of this once the form, material and motion of our natural environment has been determined.

(2) In approaching this orientation, it is suggested that out of the European Renaissance the New World inherited and projected as a prime symbol of its culture the idea of "endless space." New frontiers, new freedoms, new conquests became the orientation and direction. Such symbols become keys to the development of the society involved.

In historical reflection one finds a key, for instance, to Oriental orientation by way of its man-nature concepts where architecture becomes a wanderer through the landscape. Again as a key, the Egyptians symbolized "the way," the "procession," a kind of destiny leading to the architectural forms of tombs, areas of dedication, of sacrifice. And for the great classical age of the Greeks, the focal points of "body and form" keynoted nobility and beauty which found its way into the architecture of public gathering places and into the planning where views and perspectives were concerned. Following then our western concept of "endless space" as the key symbol, we continued to develop our form world.

(3) The form world we embraced succeeded in plundering rich lands of their top soils, stripped forests to reap the wild winds and produced land-moving operations to a degree that remains unprecedented in any other civilization. The land resources are wasted and gutted; the water reserves, polluted and imperiled.

(4) Perhaps most significant, our form world has wasted the one resource more priceless than any other—the human resource. For, in vanquishing and destroying other forms of culture, we forget that we destroy a part of ourselves.

## ARCHITECTURE FOR THE SOUTHWEST

And now, in these four points the meaning of architecture transgresses the usual connotation of building design—that of singular entity. To advocate the design of traditional pueblo or adobe architecture for the American Indian or the Spanish American is as misdirected and inappropriate as to maintain a traditional design of northern European architecture for the Anglo. The considerations and demands made by growth and change should be ever present. What forms then would best fit within the context of the natural environment? What direction would best fit the philosophical orientation? What ways can move architecture and planning to answer the essential needs?

In so far as this Southwest is concerned, several ways suggest themselves:

First, with regard to the dominant features of a building direction, no constructive influence can be realized until we start to formulate new concepts and cease to enforce maladjusted modes of life on the landscape. We can learn much from this tri-ethnic area. The Spanish and Indians used both materials and forms which offered excellent response to a dominant and harsh climate—heat, wind, and dryness. This doesn't mean that we should immediately have roofs with vegas projecting out from the walls of every house or that all rooms shall be hogan-shaped. It does suggest, however, that the nature of enclosed space, the courtyard, the free circulation of air and the resistance that clay materials give to weather conditions, all form a happy approach to building in this area.

On the next plane of building relationships lay the prospects of reconsidering the variety of closed and open space definitions, lot designations, zoning practices and the use of individual land with minimum misuse of scarce resources. And while this discussion of building forms is of extreme importance as the visual expression and detail of our landscape, the essential meaning of the environment cannot reside in buildings alone and I would like to move on to view the larger picture which presents itself in the collection of buildings called the community—that level in which architecture leaves the confines of its design within walls and stretches out to build its form within "endless space."

And so, an exploding population finds an urban society exemplified in not only the Southwest but throughout the arid and semi-arid western lands of the United States. Indeed we are, in fact, more urbanized proportionately than the East. We don't have the large megolopolis-type cities but we have *only* cities—oases on the desert, on the plains and in the mountains. High population gains in the larger cities result both from the attrition of surrounding rural lands as well as from the interior population explosion aided and abetted by continuing medical advances.

## URBAN PLANNING FOR THE SOUTHWEST

In direct response to this mushrooming of the larger cities, a growth that will continue along with the unprecedented world population boom if unchecked, I suggest that we should be developing centers in this part of the country which would enhance and enrich life at many levels. Why not communities established from the basic ecology of the region, a combination of forces that combines the natural and social environments? There are a number of possibilities that might excite us to move in response to this environment.

## NEW KINDS OF SERVICE CENTERS

Small country communities as we know them now are often a collection of meager services for the surrounding countryside and often these small rural communities are not only depleted physically but depressed in spirit as well. Why not utilize these existing small towns and rural communities and inject a modern day service system into them? Good libraries, good music with perhaps regional symphonies moving from center to center, an educational system set up to include mobile teaching units, and closed circuit television beamed into the schools for accelerated learning, modern medical clinics again with a traveling team of highly skilled professional consultants, access to repair and supply services which fulfill the demands of farm and ranch needs, and an adequate selection of goods so that the idea of choice may be developed. Such service centers aren't impossible. They could be the outgrowth of those groups whose economic reliance now is in farm land, in grazing, in mineral development or just in country living. They need not be static centers and would be far more responsive to changing needs and developments in our society than the huge vertical mass populated cities that we are spawning. Carl Kraenzel suggests similar centers to be called "rurban" communities.

A look for instance into the uplands of New Mexico finds a watershed area with ready-made communities dying on the slopes for lack of economic sustenance. But they're dying too for other reasons—the inability to cope with the changing world around them, the inability to handle the pressures and stresses of society and as well a reaction to the entire climate of thought which looks upon their simpler cultures as something to either exploit or replace. Certainly a solution here would be to encourage these people to continue within their patterns, however, rudimentary, rather than forcing their move to larger cities where misery for themselves and for their new surrounding city is too often the result. Certainly with adequate ties to service centers, to new ideas on economic opportunities which may not approximate our current commercial structure, these small communities might not only survive, but survive to develop a rich kind of life, a life that may project a strong and productive influence on our changing times.

Possible also would be the continued existence of the family farm under this system of service centers. People would not find themselves cut off from the services they need in a modern world.

And so such recognition of the diversity of people's needs might encourage all kinds of new art forms and crafts. It might aid the ever growing problems of retirement, leisure and recreation.

Existing along with these small service centers would likewise be the large regional cities at the hub, continuing unhindered by the now uncontrolled influx of people who are forced to find their sustenance at the font on one urban center—the megalopolis. At this rate a coming monstropolis at best.

The true regional center with its large commercial interests, extenuating to industrial centers, intellectual centers would provide the larger resource base as well as the line of communication to the yet larger nations and international world. Such lines of communication should be immediate, clear and constant so that contact with this larger world is never lost to the regional center and in turn to the smaller service centers.

In order to truly visualize such a combination of centers, one must see them linked by the best that technology can offer so that interaction of service and exchange may take place. Linked by an adequate system of roads, communication facilities, short-flight plane service, and not the least important the newest in rapid transit systems. Here then in reality is a possible system of natural environmental development centered in the "endless space" available in accordance with the demands of the climate, the temper of the people and their interest. Nothing is isolated or left to fall by the wayside by default. Here is the concept:

> a horizontal landscape, linking the clusters of our interests together lineally rather than the vertical urbanized core structure which accretes

unto itself the problems of civic irresponsibility, a deteriorating center, chaotic ingress and egress and a crowded competitive space where man's contributions can only recede into oblivion.

The concept suggested could bring the young people back to the towns and stem the tide to the strip city. With a social structure growing so that recreation, leisure, and shorter working hours are upon us, what we do to utilize these new hours may well affect the entire pattern of future community development. Also upon us is the time when, as new transport services make close proximity between home and office a dubious necessity, as automation gives way to a new kind of labor force, as breakthroughs in technology shift the patterns of wealth and as decreases in weaponry programs liberates new energy resources, our traditional view of the economy appears ridiculous.

And so the Southwest, the fastest growing area of the United States, an area with ample land and with the least encumbrances to forfeit invention to, might think in terms of these service centers and linked-landscape concept as a valuable contribution to some *new* frontiers, in that "endless space" which was the symbol from which we grew. We have the technology to do it; we have the diversity of interest and talent needed to inspire it, and the basic democratic principle to guide it.

In essence what is possible is the same relationship on a build-up of diverse communities that we have in units of people. First, the individual, then the family unit, then the neighborhood, the community to be followed by the city developed from a collection of communities and finally the region developed from a collection of cities. All focused about the towns and cities or service centers as proposed—centers which will befit the land as far as natural environment is concerned and benefit man as far as his needs determine—the cattleman, the farmer, the shopkeeper, the merchant, the entrepreneur, the consumer, the student, the worker, and the thinker.

The idea of this concept is to retain the qualities of culture that persist and at the same time offer additional services to such units within our lands that they may expand and grow with adequate opportunity for knowledge and understand by sharing their ideas with others if they so desire. To withhold the knowledge and the opportunity from all those who do not or will not migrate to megalopolis is an affront to our democratic ideal, much less our ingenuity. Surely we are not so bereft of ideas.

Unfortunately, there is much passion for improvement and progress as merely stop-gap measures. I feel it necessary to stress the fact that we must focus all energy upon the central betterment of man's life. In this way the Southwest, as will the vast lands of the entire semi-arid and arid West, be able to make significant contribution to the growth and development of the United States, as well as by example, to the many rising underdeveloped countries the world over.

As can be readily seen, this concept is hardly for architects and planners alone. We must bend efforts to swing research and planning facilities into these realms if anything more than mere survival at the hands of external forces is to be realized. We might think also in terms of setting up study centers in the area—for human studies as well as physical studies. Coordinated libraries and seminar centers should be made available for business, industry, government and civic reference and activity. Continuous attempts should be made to bring together people who will effectively contribute and benefit from such exposure to new frontiers. And finally, there must be a responsibility for action beyond the individualistic realm of laissez-faire and its withholding from the common good, the benefits of our true wealth, the human well-being.